FACTORS INFLUENCING SMALLHOLDERS PARTICIPATION IN AGRICULTURAL MARKETS IN SOUTHERN NIASSA, MOZAMBIQUE

By:

GASTÃO LUKANGU

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School of Agricultural Science and Agribusiness
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University of KwaZulu-Natal
PIETERMARITZBURG

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Abstract

Government, donors and NGOs in southern Niassa have been, after the 1992 peace agreement, extensively involved in agricultural development programmes to improve smallholders' food security. A study of the area and literature review revealed that many factors limited the benefits of agricultural market development programmes. Yet, opportunities in southern Niassa suggested that appropriately designed programmes could improve the standard of living of smallholders if these programmes were designed on a solid understanding of factors and strategies influencing agricultural market participation by smallholders.

The main research hypothesis of this study was that: smallholders would participate in agricultural markets when their wealth status was high, when they had enough available household labour and when cash crops were profitable." Four main hypotheses were investigated: (i) factors and strategies identified through smallholder perceptions would provide local and time specific information on the constraints and solutions to smallholder market participation; (ii) wealth status and wealth-ranking factors were positively related to market participation where agriculture was the main economic activity as in southern Niassa; (iii) labour aspects such as crop labour requirements (CLR) could be negatively related, while available household labour (AHL) and the ratio AHL/CLR could be positively related to smallholders cultivation of cash crops and subsequent participation in agricultural markets; and (iv) aspects of profitability and indicators could be used to predict smallholder cash crop preferences.

Data for this study were collected in Cuamba district of Mozambique from nine focus group discussions (FGDs) with community leaders, 287 household-head questionnaires and staff interviews during September 2002. Nine villages were randomly selected. The leaders' FGDs provided the criteria utilised to rank households according to wealth status and much of the qualitative information of this study. The wealth-ranking tool was used to identify and analyse the socio-economic factors that influenced smallholder market participation. A follow-up interview of managers of promoting institutions also provided greater insight on some aspects raised by smallholders. The study employed (i) descriptive statistics such as means and frequencies; (ii) correlation analysis and standard scores (iii) qualitative analysis was also used for some wealth-ranking, perceived labour demand and aspects of profitability influencing cash crop cultivation, preference and market participation based on

information from FGD, farmers and staff; and (iv) simple mathematical expressions for analysis and interpretation of the research findings.

This study relied on perceptions, knowledge and experience of smallholders, leaders and leaders of promoting institutions. Smallholder-suggested factors and strategies were in line with the limitations of socio-economic characteristics such as low effective household labour, particularly for females. These strategies included an improvement in outputs and inputs markets, agricultural services and credit at a subsidised prices or low interest rates. Other strategies for improving smallholders' participation in agricultural markets included promotion of profitable cash crops, household food security, provision of extension support services and information about cultivation and agricultural markets. However, smallholders did not identify some factors that have been acknowledged to influence agricultural market participation: ecological and natural resources, policies, institutional infrastructures and physical infrastructures. Smallholders also did not mention socio-economic factors (except household labour) as influencing their decisions to participate in agricultural markets in spite of the fact that researchers assume these factors in almost every study on smallholder market participation.

The findings of this research confirmed that a wealth-ranking tool could be used to identify the socio-economic factors affecting smallholders' participation in agricultural markets. The identified wealth-ranking factors such as labour, livestock number, implements and bicycles significantly correlated with wealth status and subsequently to smallholder agricultural market participation. Conversely, household socio-economic characteristics not indicated as wealth-ranking factors such as age and gender related poorly to market participation. The wealth-ranking tool could also be used to identify strategies for improving smallholder participation in agricultural markets, and to evaluate an agricultural market development programme.

The study found that, other factors being held constant, CLRs were negatively related to market participation. Weeding was the most labour intensive operation followed by harvesting, soil preparation, transportation, land clearing and seedling preparation. It also found that AHL and the ratio AHL/CLR were positive and significantly related to market participation. The ratio AHL/CLR together with household consumption requirements and yield were used to estimate the total area a household could cultivate, both for food crops

for consumption and for cash crops; the proportion of farmers likely to participate in the market; and those unable to cultivate enough for consumption.

The research also confirmed that profitability-related aspects correlated to cash crop preferences. Yield was the most important factor that influenced smallholders' preference for cash crops. It was also found that indicators incorporating more aspects of profitability correlated strongly with cash crop preferences. The correlation increased as more aspects were incorporated. A crop, such as tobacco, with a profit of more than twice the profit for food cash crops was preferred more than food cash crops. The indicators and underlying aspects of profitability were used to interpret the current and projected cash crop preference.

Declaration of Originality

I, _____, hereby declare that the research reported in this thesis is the results of my own investigations, except where acknowledge, and has not in its entirety or in part submitted to any University or Institution for degree purposes.

Signed: _____

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And
For faith He has put in me that these findings will be useful for the poor.

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List of Abbreviations

AAA	German Agro Action (International NGO from German)
ACRIS	Acção Cristã Interdenominacional de Saúde (Mozambican NGO)
ADC	Cuamba based microfinance NGO
AMODER	Associação Moçambican para o Desenvolvimento Rural
CLUSA	Cooperative League of United State of America
CORD	Christian Outreach Relief and Development (International NGO from UK)
EC	Commercialisation strategies
ESTAMOS	Mozambican NGO
EU	European Union
EXPORT MARKETING	An Agribusiness trading company operating in Northern Mozambique
GAPI	Gabinete de Apoio e Promoçâo de Investimentos
IBIS	International NGO from Denamark
INIA	Instituto Nacional de Investigação Agrónomica
INTERMOND	International NGO from Spain
JFS	João Ferreira dos Santos Company
MONAP	Mozambican Nordic Agricultural Programme
MOVIMUNDO	International NGO from Italy
NEPAD	New Partnership for African Development
OIKOS	International NGO from Portugal
OXFAM	International NGO from UK
PAMA	Programme for the support of agricultural markes
PARPA	Action Plan for Reduction of Absolute Poverty (2000 – 2004)
PDAN	Programme for Agricultural Development of Niassa
PROAGRI	Programme for Rural Development
PROANI	Programme Avant Niassa (SIDA funded programme)
SIDA	Swedish International Development Agency
UCASN	União de Camponeses e Associações a Sul de Niassa
V & M	An Agribusiness trading company operating in Northern Mozambique
WORLD RELIEF	International NGO from USA

CHAPTER 1 : INTRODUCTION

1.1 Objective

More than 70 percent of the poor of Mozambique's population live in rural areas and of these, 80 percent depend on agricultural activities for their livelihoods (Wandschneider and Garrido-Mirapex, 1999). Agricultural development can improve food security, the economy, and support the development of other non-agricultural sectors (Davies, 1997; Tickner *et al*, 2001; Carrilho *et al*, 2003). Many institutions in southern Niassa in Mozambique have, after the peace agreement in 1992, embarked on implementing a variety of agricultural marketing development activities to improve the standard of living of smallholders (PAMA, 2003). Since 1992 there has been visible growth in agricultural production and marketing.

However, it is debatable whether these strategies have produced the expected impact of stimulating agricultural growth at smallholder household level to improve standards of living (Manussa, 2003). Many factors seem to hinder agricultural market participation or limit the benefits of participating in agricultural markets. These factors may include those related to poor cropping systems, inappropriateness of policies, poor infrastructures and promotion of unprofitable cash crops by NGOs, extension services and agribusiness institutions (Tickner *et al*, 2001; Bias and Donovan, 2003). Yet southern Niassa presents opportunities that, if properly used, can stimulate agricultural growth at the household level. These opportunities include motivation from all market participants to develop both agricultural markets and the vast agricultural resources that exist in the region (PAMA, 2003). Application of appropriate strategies is likely to reduce the constraints and take advantage of existing opportunities to improve market participation and the respective benefits.

This study was motivated by the desire to understand the factors influencing smallholders' cropping decisions and participation in agricultural markets in order to improve food and income security in a sustainable manner in southern Niassa. The specific objectives of the study are:

(i) Analyzing wealth status and its influence on smallholder participation in agricultural markets using a wealth-ranking tool.

(ii) Analyzing labour aspects that affect smallholder participation in agricultural markets; and

(iii) Determining how various aspects of profitability and indicators calculated from these aspects can be used to predict smallholders' cash crop preferences.

1.2 Justification

Agricultural development is viewed as a means to improve the living standards of smallholders and general economic growth (Davies, 1997; Tickner *et al*, 2001). Non-agricultural livelihood strategies were scarce in southern Niassa (Tickner *et al*, 2001; Carrilho *et al*, 2003). Income from migrants, sale of labour to neighbours, sale of local construction materials, firewood and other non-agricultural income generating activities provided small incomes to few households (Tickner *et al*, 2001; Carrilho *et al*, 2003).

Government, donors and NGOs have attempted to improve the living of smallholder farmers in southern Niassa through various development activities (PAMA, 2003). Roads and railways have been repaired; communication systems have improved; there are more credit services than before the peace agreement; significant progress has been made in developing farmers' associations; extension from government and NGOs covers more areas than before the peace agreement in 1992; more local buyers are now available for smallholder outputs; and some small scale processing industries existed in the region. The effect of these interventions in southern Niassa can be observed by the high percentage (73%) of households participating in agricultural markets (PAMA, 2003). Agricultural growth at the provincial level has improved and projections suggest that it will continue to grow.

However, it is debatable whether these strategies have produced the expected impact of improving food and income security at the household level (Manussa, 2003). Historical observation shows a constant gross income of about US$130/household per annum for the last six years (MAP/MSU Research Team, 1997; PAMA, 2003). Malnutrition such as anaemia and pellagra continue to be reported (Bias and Donovan, 2003). January and February continue to be the famine months when some households revert to wild foods for survival. Niassa continues to present a high but steady rate of low birth weight (12%) (Instituto National de Estatística, 2001).

Constraints to agricultural development could range from aspects related to cropping systems, inappropriateness of policies, poor infrastructures, unprofitable crops, poor yields, low prices, lack of credit, inefficient farmers' associations, weather vagaries, low literacy rates, AIDS infection, poor extension systems, failure to provide inputs and agricultural services, difficulties in buying smallholders' outputs, poor quality products, and distortions of marketing principles due to donations (Jeje *et al*, 1998; Tickner *et al*, 2001; T&B Consultant and CONSIA Consultants, 2002; Bias and Donovan, 2003).

Southern Niassa also presented opportunities for agricultural market development. Strong incentives and action by households, donors, government, NGOs and private companies to improve the standard of living through agricultural marketing constituted an opportunity for the development of agricultural markets. Abundant land and good agro-ecological conditions for cultivation will facilitate smallholder market participation (Jeje *et al*, 1998). In addition, more than 10 NGOs, three large agribusiness companies, 66 formal buyers, 276 informal buyers and an unknown number of Malawian buyers were involved in agricultural market activities in the region (PAMA, 2003). A better understanding of underlying factors influencing smallholder farmers' cultivation decisions and participation in agricultural markets, the strategies that promoters applied, the mistakes made by promoters and existing opportunities for promoting cash crops could serve as a basis for designing appropriate agricultural market development strategies for southern Niassa.

1.3 Activity Undertaken

Data for this study were collected in Cuamba district based on cluster sampling involving villages grouped along the key routes from the City of Cuamba to different districts of southern Niassa, Nampula and Zambezia provinces. One to two villages per route were selected. The study benefitted from World Relief-SempreVerde materials, employees and students from the Faculty of Agriculture at the Catholic University of Mozambique conducted interviews. It also used people with at least 12 grades of schooling and fluent in the *Makhua* language to conduct the survey. The survey, conducted between September and October 2002, involved:

(i) An initial focus group discussion (FGD) with nine groups of leaders: The interviewer facilitated the discussion on aspects related to agricultural cultivation and marketing, identification of wealth ranking categories used in the village and

the criteria utilised to rank households in these categories. The FGDs culminated in ranking households into wealth categories by the leaders.

(i) A total of 287 usable questionnaires from nine villages: Stratified sampling, taking into consideration the marital and wealth status, was used. A ten percent sample of villages with an average of 320 households resulted. The questionnaire covered household socio-economic characteristics, cropping information, reason for adoption, rejection or discontinuation of crops, ranking of crops in terms of labour requirements and profitability, the ideal cash crops and respective income and advice for improvement of agricultural market development activities of promoters.

(ii) Follow up questionnaires about labour: This follow-up questionnaire addressed aspects related to crop labour requirements, labour demand throughout the year, the most labour demanding operations, ranking of crops according to labour demand and possible strategies for reducing demand for labour at the household level.

(iii) Interviews with individual staff members from relevant crop promoting institutions. This reflected a managerial view about the factors influencing adoption, rejection and discontinuation of the cash crops they promoted. Data collected from the FGDs and interviews with senior staff of promoting institutions were compared to ensure the integrity of information provided by smallholders using questionnaires.

Data were entered into an Excel spreadsheet for later analysis using descriptive statistics, correlation analyses, Z score tests, confidence limits, qualitative analysis based on information from focus group discussions, and simple mathematical formulae for interpretation of labour and profitability aspects influencing smallholders' participation in agricultural markets.

This study also draws from the author's previous research in the same area in 2001 (Lukanu *et al*, 2004; see Annexure 1). Because of a lack of literature for southern Niassa, the author performed a quick survey to analyze farmers' cash crop cultivation decisions to identify key factors influencing smallholders' participation in agricultural markets. Smallholders considered the following factors when making decisions about adopting and retaining cash crops in their cropping system: (i) crops with dual purpose or crops that could be consumed

and sold; (ii) crops that could be intercropped with maize; (iii) crops resistant to water stress, pests and diseases; (iv) crops with low labour force requirement; (v) profitable crops; and (vi) crops promoted by credible institutions in term of provision of extension, technical assistance and market availability. Labour force requirements and profitability of the crops were the most important factors mentioned by the farmers. The other factors mentioned above can explicitly or implicitly be grouped into these two factors. For example, farmers preferred crops with a dual purpose such as maize because of failed market experiences when a buyer of crops such as paprika, for example, did not show up to buy the harvest. Unlike maize, farmers could not consume the paprika if the buyer failed to collect the outputs. This factor affected profitability because an unsold crop resulted in a loss (a negative profit). One of the reasons for preferring intercropping or crop mixing was the maximum use of available household labour. This preliminary study was used as a basis for the formulation of the hypotheses of this study.

1.4 Problems and Hypotheses of the Study

The main research problem of this study was to determine how relative wealth status, available household labour and cash crops profitability influenced cropping decisions and smallholder participation in the agricultural market. The main hypothesis of the study was that wealth status, available household labour and profitability of cash crops could be positively related to smallholders' participation in agricultural markets. Three main sub-problems were analysed:

1.4.1 Sub-problem One

Determine whether wealth status influenced smallholder participation in agricultural markets. It was hypothesised that wealth status could be positively related to market participation where agriculture was the main economic activity such as in southern Niassa. Based on this expectation, a sub-hypothesis was proposed for investigation: wealth-ranking factors (most of them household socio-economic characteristics) could be positively related to market participation where agriculture was the main economic activity. In the preliminary study performed by the author, smallholders did not indicate the socio-economic factors that influenced their participation in agricultural markets (Lukanu *et al*, 2004). Yet these factors were included in most of the studies on agricultural markets. Confirmation of this hypothesis (and the converse hypothesis) would also suggest that the wealth-ranking tool could be used to identify and analyze the household socio-economic factors influencing smallholder participation in agricultural markets based on information from local people.

1.4.2 Sub-problem Two

Analyze labour aspects that influence smallholders' cultivation of cash crops and subsequent participation in agricultural markets. This sub-problem had three main hypotheses:

(i) Other factors[1] being held constant, smallholders' cultivation of cash crops and subsequent participation in agricultural markets would be inversely related to crop labour requirements (CLR) where manual labour was the main source of energy;

(ii) Other factors being held constant, available household labour (AHL) would be related positively to smallholders' cultivation of cash crops and subsequent participation in agricultural markets where manual labour was the main source of energy; and

(iii) Other factors being held constant, the ratio AHL/CLR during peak periods would be positively related to smallholder participation in agricultural markets.

1.4.3 Sub-problem Three

Determine how various financial and non-financial aspects of profitability and indicators of profitability calculated from these aspects could be used to predict smallholders' cash crop preference. It was hypothesised that:

(i) Financial and non-financial aspects that influence profitability such as farm gate price, yield/production, cost of inputs and labour, reliability of the price, access to inputs, access to extension and access to reliable buyers could also influence smallholder preference for a cash crop; and

(ii) Indicators of profitability that incorporated more financial and non-financial aspects of profitability could better predict smallholder preference for a certain cash crop than those indicators that incorporated few aspects.

The importance of this study was then also to identify simple and readily determinable indicator/s of profitability that best predicted smallholders' cash crop preferences, which could be made available for use by development practitioners in the field.

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[1] *Factors such as crop profitability, buyers' availability, input availability, and extension and livestock ownership would also affect market participation.*

1.5 Definition of Terms

A. Agricultural Market Participation

Agricultural market participation in this study was defined in two ways. In the first definition, agricultural market participation reflected the number of cash crops sold. This definition was used when comparing households or groups of smallholders in terms of their participation in agricultural markets. In the second definition, agricultural market participation reflected the percentage of farmers marketing a cash crop. This definition was used when comparing cash crops in relation to smallholders' participation in the agricultural markets.

B. Cash Crops

Cash crops in this study referred to any cropped products that smallholders could sell, be they food cash crops (maize, cassava, sorghum, boer bean, cowpea or the like) or promoted cash crops (those crops promoted by specialised institutions for cash return such as tobacco, cotton and paprika; or a crop less likely to be sold in the local markets for local consumption such as sesame and sunflower).

C. Wealth-ranking Factors

Wealth-ranking factors were the socio-economic factors or criteria used to rank members in wealth status categories.

D. Crop Labour Requirements (CLR)

Crop labour requirements (CLR) referred to the number of working days (a day of eight hours of work needed) per person to cultivate a given crop using the existing technology.

E. Available Household Labour (AHL)

Available household labour was defined as the total number of working days a household had, based on its effective household labourers (household active members plus casual labourers employed by the households minus the members of the households employed by other households).

F. Cash Crop Preference

Cash crop preferences reflected the number of farmers participating in the cultivation and marketing of the respective cash crop. A cash crop with more farmers participating was preferred to cash crops with small numbers of farmers participating.

G. Aspects of Profitability

Aspects of profitability referred to financial and non-financial factors that influenced the profitability of cash crops such as price, yield, costs of inputs and labour, reliability of the price, access to extension and inputs, and access to reliable markets.

H. Indicator of profitability

The indicator of profitability referred to an objective and/or subjective number or rank obtained through a calculation or mental process that combined two or more financial and/or non-financial aspects of profitability. The comparisons of the indicator from various cash crops could provide an indication of the profitability of a cash crop in relation to others.

I. Factors

Factors were used in this study to indicate those aspects that, positively or negatively, influenced smallholders' participation in agricultural markets. The negative factors included the constraints while the positive factors included all those positive aspects of crops and promoters activities that motivated smallholders' participation in agricultural markets.

J. Strategies

Strategies in this study referred to agricultural market development activities capable of creating conditions for improved participation of smallholders in agricultural markets. Strategies were included as factors influencing smallholder participation in agricultural markets.

K. Ganho-Ganho

Ganho-Ganho in this study referred to external labourers (outside household people) working on the household fields. This term is widely used in Northern Mozambique and Malawi. The term will be used often in this study.

1.6 Limits of the Research

A. Market Volume, Revenue from Sales and Market Participation

The study did not utilise marketed volume or revenues from selling of agricultural products as a measure of market participation (Makhura, 2001). These important elements for assessing market participation were not assessed. Nevertheless, the study used the number of promoted cash crops sold as an indication of market participation in Chapter 5 and Chapter 6; and the percentage of people participating in the selling of a given cash crop as a measure of smallholders' market participation for that crop in Chapter 7 and Chapter 8. Heltberg and Tarp (2002) and PAMA (2003) also expressed agricultural market participation for Mozambique in terms of percentage of smallholders involved in the selling of cash crops.

B. Contract Farming

The study was performed in southern Niassa where a contract farming company operates, the João Ferreira dos Santos (JFS) Company. The study analyses the participation of farmers in crops promoted by JFS Company, and it explains how the strategies utilised by this promoter affected smallholder participation. However, the study is not involved in the detailed and specific research and analysis of contract farming and its influence in agricultural markets. A review of literature was provided in Chapter 2 and Chapter 3. Work by PAMA (2003) and Lukanu *et al* (2004) also discussed some aspects of contract farming in southern Niassa.

C. Farmer's Associations

The study was performed in southern Niassa where OXFAM (an international NGO from the UK) in combination with "União dos Camponeses a Sul de Niassa (UCASN) assisted farmers organised in associations to cultivate crops and cash crops. However, the study did not analyze specifically the participation of farmers in crops promoted by OXFAM/UCASN. These crops were also promoted by other NGOs such as German Agro Action and World Relief - SempreVerde. That is, the study will not explore the detailed and specific analysis of farmers associations and their influence in agricultural markets. A review of literature is provided in Chapter 3 that includes UCASN activities. Work by PAMA (2003) discussed UCASN activities in southern Niassa extensively.

D. Transaction Costs

Smallholder participation in agricultural markets has been the subject of study by economists (Goetz, 1992; Matungul, 2002). These studies have been used in the review of literature. Recent work by Makhura (2001) and Matungul (2002) have been used to explain and support some of the findings of this study. Nevertheless, the study is not a specific study about transaction costs and smallholder participation in agricultural markets.

E. Cause-effect relationship between wealth status and market participation

Chapter 6 of this study used wealth ranking to analyze factors influencing smallholders' participation in agricultural markets. The author is aware of the reciprocal cause-effect relationship between wealth status and market participation. This study, however, will be limited to analyzing wealth status and wealth-ranking factors as influencing smallholder participation in agricultural markets.

F. Testing of strategies

The study has attempted to suggest strategies based on the findings. Practical examples have been provided. Nevertheless, testing of the strategies for improving agricultural market participation was not part of this study.

1.7 Who Should Benefit from this Research?

Theories to be generated in this study would mainly improve the work of promoters of cash crops (NGOs, agricultural outgrower schemes and government extension services), donors and agricultural development researchers willing to affect positively the standard of living of smallholder farmers through the agricultural market. In many parts of Sub-Saharan Africa, resources and time were wasted when poorly designed agricultural development project proposals were implemented (Agunga, 1997). This was mainly due to project design based on wrongly identified factors used to design strategies, use of inappropriate approaches to tackle constraints and to the lack of use of existing opportunities. Solutions to the research sub-problems outlined above would also help identify the factors influencing smallholders' cropping decisions and participation in agricultural markets for improving agricultural market development activities in southern Niassa.

The main material beneficiaries of this study would be the smallholders, providers of agricultural inputs and agricultural services and buyers of smallholders' outputs. Poorly designed projects constituted a prejudice against smallholder farmers, agribusiness companies and traders as they invested their resources only to experience losses. Therefore, by improving participation in agricultural markets, smallholder farmers would improve their incomes and food security while agribusiness companies and traders could increase financial efficiencies. In addition, satisfaction of the agricultural market participants was a necessary ingredient for the sustainable participation of agribusiness institutions that provided cultivation and marketing services to smallholders.

1.8 Outline of the Research

This research report is organised into nine chapters. Chapters 6, Chapter 7 and Chapter 8 were organised in paper format for submission for publication. Below is the description of each of the chapters and the way it relates to other chapters:

(i) The introduction as Chapter 1 describes the objectives, justification, the activities undertaken, problems and hypotheses investigated, the definitions of terms, the limits of the study and the importance of the study for smallholders, NGOs, donors and government institutions.

(ii) Chapter 2 reviews literature about the various factors influencing smallholders' participation in agricultural markets. The chapter covers aspects such as food availability, prices, ecological and technological factors, household characteristics, extension services, policies, institutional infrastructures, physical infrastructures, access to markets, risks and uncertainty about agricultural markets. Some references from this chapter are used to support (or contrast) the findings of this study in Chapter 6, Chapter 7 and Chapter 8.

(iii) Chapter 3 described the southern Niassa area in relation to the past and current situation of various factors that could affect smallholders' participation in agricultural markets. Some of the aspects covered included: farming systems, cash crop promoters, rural infrastructures, communication and market information, extension and buying of agricultural products. A summary about the description of the area from Chapter 3 has been included in Chapter 6, Chapter 7 and Chapter 8 that were formatted as papers for publication in journals.

(iv) Chapter 4 refers to the methodology employed to collect and assess the data in this study. The chapter covers aspects such as the study area and the survey strategies and techniques. As before, a summary of the methodology has also been included in Chapter 6, Chapter 7 and Chapter 8.

(v) The fifth chapter provides a description of the sampled households in terms of socio-economic characteristics, location and access to markets. The chapter also describes the overall participation of smallholders in agricultural markets and how smallholders participated in each cash crop analysed in this study. Further, the chapter provided information about smallholders' perceptions of factors influencing their rejection of or continuation with cultivating cash crops. Smallholders' information has been used to compare the findings of the study described in Chapter 6, Chapter 7 and Chapter 8.

(vi) Chapter 6 analyses the relationships between wealth status, wealth-ranking factors and market participation. Chapter 6 also used some information about the smallholders from Chapter 5. Where possible, reference has been made to the section or table where the specific information could be found.

(vii) Chapter 7 analyses the labour aspects influencing smallholders' participation in agricultural markets in southern Niassa. The paper analyses how crop labour requirements, available household labour, area for food crop for consumption and cash crops affect smallholder participation in agricultural markets. Chapter 7 also used some information about the smallholders from Chapter 5.

(viii) Chapter 8 investigated the aspects of profitability that influenced smallholders' participation in agricultural markets. These aspects are divided into financial and non-financial aspects of profitability that influence smallholders' participation in agricultural markets. The indicators of profitability (calculated from aspects of profitability) are also analysed. This chapter used some data from Chapter 7. It also relied on farmers' information summarised in Chapter 5.

(ix) Chapter 9 is the concluding chapter. It provides the conclusions for various findings identified in Chapter 5, Chapter 6, Chapter 7 and Chapter 8. The chapter also provides the overall conclusion of the study and the recommendations to improve smallholders' participation in agricultural markets. In addition, the chapter provides a list of possible research topics that could be undertaken to extend the knowledge of factors influencing smallholders' participation in agricultural markets.

Abbreviations used in this study have been listed before Chapter 1. Relevant information for understanding of thesis has also been included in the Annexure section. For example, a paper from preliminary study, the questionnaires utilised, and extracts of data and statistics are included as Annexures.

CHAPTER 2 : REVIEW OF LITERATURE

2.1 Introduction

Literature was reviewed in order to understand the factors influencing smallholder cultivation decisions and agricultural market participation. Smallholder participation in agricultural markets has been the subject of study by agricultural economists (Goetz, 1992; Matungul, 2002). Most of these studies were based on the framework of transaction cost economics (TCE), part of the New Institution Economics (NIE) framework postulated by Coase (1937). Factors that affected transaction costs would affect economic growth, and could be used to explain agricultural market participation at the household level. Transaction costs included the cost of: accessing market information, collecting, preparing, packaging, storing, handling and transporting products, spoilage and losses, taxes, searching for and screening partners and products, bargaining, contract making, and others (Coase, 1937; Zaibelt and Dunn, 1998; Fafchamps and Minten, 2001).

However, few empirical studies have been undertaken to find the relationship between transaction costs and market participation because of a number of conceptual and measurement difficulties (Makhura, 2001; Matungul, 2002). Often, the influence of transaction costs on market participation was analysed indirectly through explanatory variables that affected market participation (Matungul, 2002). For example, researchers inferred the magnitude of transaction costs based on participants' and crop characteristics such as household literacy rates, gender, off-farm income, ownership of means of transportation, distance from markets, market costs and farm gate prices (Goetz, 1992).

Delgado (1999) acknowledged that factors influencing agricultural markets could be broadened to include those involving cultivation. Taking this broad view into consideration, factors affecting agricultural marketing could include those related to: (i) agro-ecological and natural resources (Farson-Baidu *et al*, 1997; Binswanger and Rosenweig, 1986); (ii) household socio-economic characteristics (Nji and Sama, 1987; Fenwick and Lyne, 1999; Kalinda *et al*, 2000; Abalu *et al*, 1987); (iii) research, development and extension (Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003; Anderson, 2003); (iv) market policies and institutional infrastructures (Fafchamps and Minten, 2001; Makhura, 2001); (v) physical infrastructures (Omamo,

1998); and (vi) access to markets for inputs, credit and output (Goetz, 1992; Farson-Baidu *et al*, 1997; Poulton *et al*, 1998).

The interaction of the factors above will affect other factors that have been shown to influence market participation: (i) production (Boeteng *et al*, 1987; Masuku *et al*, 2001); (ii) farm gate price of inputs, agricultural services and outputs (van Zyl and Coetzee, 1990); and (iii) cultivation and marketing risks that determined smallholders' decision to cultivate and/or to participate in agricultural markets (Binswanger and Rosenzweig, 1986). A broad analysis of factors affecting market participation was likely to generate a greater understanding that could be used to design appropriate strategies for improving smallholder market participation.

2.2 Factors Influencing Agricultural Market Participation

This literature review discusses the influence of household food availability, price and profitability of cash crops, agro-ecological factors and households' socio-economic factors on agricultural market participation. It also reviews factors related to extension, policies, institutional infrastructures, physical infrastructures and access to markets.

2.2.1 Food Availability and Market Participation

Smallholders in Sub-Saharan Africa cultivated firstly for subsistence to secure food availability and used the surplus production and/or resources for income generation (Boeteng *et al*, 1987). Masuku *et al* (2001) reported that smallholders in Swaziland consumed about 80% of production while the remaining was sold to generate income needed for food, clothes, medical care, children's schooling, improvement in housing conditions and investment in the agriculture, livestock and off-farm income.

Key *et al* (2000) suggested that households preferred not to participate in agricultural markets if they felt that their total expenditure (largely expenditure for household consumption) would be higher than the total income from various sources, including the income from crop sales. According to Zaibelt and Dunn (1998) food security at the household level was better achieved by a higher degree of food self-sufficiency at the household level. Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural (2003) and Smale (1995) also suggested that low yields due to poor

rains and/or lack of inputs increased the proportion of the resources smallholders assigned to food crops for consumption to the detriment of those used for cash crops.

Theory based on consumption/sales suggests that only surplus producers participate in agricultural markets. In developing countries, there may not even be enough food for the household when things go badly on the farm (Anderson, 2003). However, Ejupu *et al* (1999) reported a case in Uganda of deficit producers engaging in the sale of agricultural outputs. Some households were simultaneously deficit producers and market participants at the same time, even during good agro-ecological years (Goetz, 1992).

2.2.2 Price and Profitability of Crops

It is commonly acknowledged that the farm gate prices are an incentive to smallholders' participation in agricultural markets (van Zyl and Coetzee, 1990). Key *et al* (2000) predicted that a one percent increase in farm gate price increased the probability that a household would participate in agricultural markets by 0.77 percent. Madikizeko and Groenewald (1998) suggested that farmers would always try to determine where they could get the best price for a given crop in order to sell their products.

Oscillation in farm gate prices, mainly for food cash crops, during the year and between years affected farmers' behaviour toward market participation. When prices were low, smallholder farmers tended to reduce their production in the following year, creating a shortage of supply and an increase in price and vice versa (Anderson, 2003). This phenomenon happened because of forecasting errors that led farmers to use resources sub- or over-optimally. Production and price fluctuation have been due to: (i) cultivation of the same products by the majority of farmers; (ii) seasonality; and (iii) covariance of agricultural activities (Anderson, 2003; Ministério de Industria e Comércio and Ministério de Agricultural e Desenvolvimento Rural, 2003). Prices have frequently been lower during good rainy years while higher during years of poor rainfall. Key *et al* (2000) also reported that transaction costs negatively affected the farm gate price by creating a situation whereby smallholders found it unprofitable to sell. Price stabilisation should be viewed as a strategy for stimulating production and improving agricultural market participation (Goetz, 1992; Anderson, 2003). Storing was one of the major strategies for stabilising prices. However, smallholders rarely stored products because they were obliged to sell in response to pressing cash needs (Binswanger and McIntire, 1987). Inadequate drying of agricultural products

which caused deterioration and mice and other pest attacks could destroy a considerable proportion of the maize, beans and other crops (Tickner *et al*, 2001)

One important factor discussed by Boeteng *et al* (1987) and Anderson (2003) was that smallholders reacted to profitability incentives rather than to price alone. These authors found that smallholders in Ghana preferred to cultivate and market food cash crops because they were more profitable than cocoa. They stressed that farmers' decisions were economically rational and that cocoa would be preferred only if the profit increased four times. Farmers' concern for market access was related to their worry about failing to sell. This would mean losses or zero profit.

2.2.3 Ecological and Technological Factors

Ecological factors, such as the weather, pests and diseases, cause variability of yield and a subsequent unstable supply of agricultural commodities (Anderson, 2003). For example, poor rains were reported as the main factor that reduced groundnut production in Niger, causing aflatoxin contamination, poor quality of production and subsequently reduced export of groundnuts. Reduction in export affected marketing of groundnuts in Niger. Dependency on rains and annual rain patterns made timing of operations unpredictable and made cultivation and agribusiness seasonal activities (Binswanger and Rosenweig, 1986). Covariance risks are variations in crop or livestock output that all the farmers cultivating in the same geographical sub-region experience simultaneously (Binswanger and McIntire, 1987; Anderson, 2003). Yield was also severely affected by pests, disease and weed attacks.

2.2.4 Household Characteristics

This section discussed some of the household characteristics that have been found to affect smallholder participation in agricultural market. The following factors were discussed: literacy rate of the household head, gender of the household head, age of the household head, the size of the cultivated land, household labourers, household size, ownership of livestock, off-farm income and ownership of transport facilities and distance from the market.

A. Literacy Rate

Literacy was generally acknowledged to influence smallholders' agricultural market participation positively. Some of the reasons that helped literate households to cultivate and participate in the market included: (i) enhanced ability to receive, decode, and understand

information from print and mass media channels; (ii) easy contact with outsiders; (iii) understanding of concepts related to causality, arithmetic, weights and measures that increased the ability to conceptualise abstract ideas; (iv) improved managerial ability; and v) sensibility to science and technology (Mook, 1981; Feder *et al*, 1985; Akesson, 1994; Masuku *et al*, 2001).

Highly literate households could access and utilise information at lower costs than non-educated households (Makhura, 2001). Nji and Sama (1987) suggested that lack of formal schooling explained the poor adoption of productive agricultural technology by smallholders in Cameroon.

Mook (1981) suggested that the difference in adoption between the educated and non-educated declined with increasing extension contact or provision of information. According to Feder *et al* (1985) education had no impact on adoption of crops in regions with traditional agricultural practices. Hornik's (1993) review of literature revealed that education supported the adoption of innovations only if it was directed toward developing a problem-solving ability.

B. Gender of the Household Head

Akesson (1994), using gender characteristics in Mozambique, classified rural households according to households headed by men alone, women alone, or couples. She found that an unmarried, divorced or a second wife in a polygamous situation was less likely to participate in development programmes. Such women lacked time, labour and resources because they had to manage the household, collect firewood and water, cook, educate and take care of children apart from agricultural activities (Tickner *et al*, 2001). She was also unable to perform some agricultural operations assigned to a man such as tree cutting.

Knowledge of the gender of the household head also gave an indication of who was the decision-maker about cultivation of cash crops and market participation. The decision-maker's perception, attitude or intention needed to be taken into account when designing an agricultural market related project (Schiffman and Kanuk, 1987). For example, it was well known that wives tended to cultivate more food crops while men tended more toward promoted cash crops (Nji and Sama, 1987; Tickner *et al*, 2001). That is, female-headed households were more likely to participate in markets of food cash crops than the male-headed ones.

Fenwick and Lyne (1999) reported that female-headed households in KwaZulu-Natal, South Africa, faced problems of land insecurity, limited access to common property, lacked production equipment, and were mostly illiterate. Kalinda *et al* (2000) 's study in Zambia also found that female-headed households owned significantly less land (6ha) than male households (7.8 ha) for cultivation and grazing, affecting therefore the potential volume of production and the numbers of livestock. Those authors also reported that female-headed households were relatively poor, tended to have reduced numbers of members in the household and had limits on increasing cultivated field sizes. In addition, they found that female-headed households had significantly lower numbers of oxen for ploughing than male-headed ones. However, it was also important to stress the work by Farson-Baidu *et al* (1997) who did not find any evidence of gender-based diversity on the cultivation of groundnuts in Niger.

C. Age of the Household Head

The effect of age on market participation was often contradictory, as it could positively or negatively affect the decision to cultivate or participate in agricultural markets (Adesina and Zinnah, 1993). It was believed that younger farmers were more inclined to search for information compared to their older counterparts (Masuku *et al*, 2001). According to Polson and Spencer (1991) younger farmers were greater risk takers due to their longer planning horizons.

However, Mook (1981) and Goetz (1992) suggested that older farmers were more likely to cultivate and participate in markets of cash crops than younger farmers because of the effect of age on experience about trading opportunities. Experience also reflected increased trust gained through repeated experience with the same partners (Goetz, 1992). However, authors, mainly in the diffusion of innovation arena, have advanced reasons for the negative relationship between adoption and age, which may also apply to market participation (Lee and Steward, 1983; Akinola, 1987; Bembridge and Williams, 1990; Anderson *et al*, 1999).. These reasons include: (i) increased physical limitations to adopt labour-demanding innovations for farmers over 60 years old; (ii) strong support for negative traditions; (iii) shorter planning horizons; and (v) high risk aversion of older farmers. Rogers (1962) reported that few findings suggested an age-adoption relationship based on the analysis of various researches.

D. Land Ownership

Land ownership affected cultivation and market participation because it was a natural asset and the main factor in agricultural production (Binswanger and Rosenweig, 1986). Availability and utilisation of this asset would be influenced by the climate of the zone, soil type, land use pattern, and population density (Manussa, 2003). In most rural African settings, households possessed land through inheritance, on loan, as reserved community land, or through opening new fields far from their village (Akesson, 1994). In a traditional system, the tribal authority or a lineage-head assigned user rights to a piece of land. However, households did not possess title deeds to their land. In addition, the traditional system precluded a market for agricultural land. Akesson (1994) reported that the cost of land, for Tete (Mozambique) was relatively low but the insecurity of tenure was very high because of lack of title deeds.

The Fenwick and Lyne (1999) study suggested that access to more land positively influenced repayment of loans in KwaZulu-Natal, South Africa. This suggests that land ownership could influence access to loans for additional working capital to increase the cultivated area, the productivity and subsequently market participation (Binswanger and McIntire, 1987). Therefore, land ownership in such a situation does not have value. Consequently, one cannot link credit for inputs and service provision to land as collateral (Binswanger and McIntire, 1987; Fenwick and Lyne, 1999).

However, land was not a limiting factor in many Sub-Sahara African countries within the tropics because of low population density compared to Asia (Binswanger and McIntire, 1987). For example, Farson-Baidu *et al* (1997) found that land tenure insecurity was not a problem for smallholders' cultivation and marketing of groundnuts in Niger.

E. Size of the Cultivated Land

The relationship between the size of the field and market participation has to do with increased household production for consumption and for sale. For example, Nji and Sama (1987) suggested that there existed a high correlation between the size of the field and agricultural income generated by households in Cameroon. Economists explain that fixed transaction costs decrease with per unit increase in area/production (Fenwick and Lyne, 1999). That is, the larger the area and production the lower the percentage of fixed

transaction costs would be in relation to the total revenue and the more likely it was that smallholders would participate in agricultural markets (Matungul, 2002).

F. Household Labourers

Labour was considered efficient when it came from households that had a high literacy rates, were healthier, physically capable of carrying out agricultural work and had large amounts of household labour available (Manussa, 2003). This is because literacy was needed for skilled labour while strength was need for physical labour. Nji and Sama (1987) indicated that labour availability limited the cultivated area to about 2.6 ha per household in Cameroon. This small field, due to limited labour capacity, was a major source of inefficiency for agricultural income generation (Zaibelt and Dunn, 1998). For example, labour could limit the ability to sow a large area very quickly, to make use of water from early rains and complete weeding operations quickly (Abalu *et al*, 1987). Feder *et al* (1985) reported that labour shortages might influence the adoption of labour intensive technology.

G. Household Size

Household size could influence market participation through its effect on labour in the area of cultivated land and on the volume of production that could be consumed and sold (Kebede *et al*, 1990). The smaller the family, the lower would be the probability of adopting labour-demanding innovations (Kebede *et al*, 1990; Fernandez-Cornejo *et al*, 1994). However, availability and access to financial assets could help households hire casual labour to increase the availability of household labour (Binswanger and Rosenweig, 1986). Nji and Sama (1987) reported that in Cameroon more than 70 percent of households hired casual labour during peak periods (for weeding, pruning and harvesting of coffee) paying them in cash or in kind. Kalinda *et al* (2000) reported that members of poor households worked as hired labour for others during the cultivation period. Carrilho *et al* (2003) reported that about 20 percent of the households in Mozambique employed casual labourers to work in their fields. Households that hired casual labourers cultivated more land and they were more likely to cultivate cash crops (Carrilho *et al*, 2003).

A larger household size also meant that more food was needed to feed the household members (Goetz, 1992). The larger the consumption requirement, the less a household could sell. Therefore, larger household size may, in real terms, not be a synonym for more

labour availability when some family members such as school children and the elderly are not full time operators (Polson and Spencer, 1991).

H. Ownership of Livestock

Ownership of livestock was a major source of income and an insurance substitute (Binswanger and McIntire, 1987). Livestock has been the major source of households' income in Zambia (Kalinda *et al*, 2000). Livestock provides a risk diversification benefit (Binswanger and McIntire, 1987). Livestock ownership is a proxy for wealth (Kalinda *et al*, 2000). Apart from increasing the labour efficiency of the household, draught power could be rented and could generate income that was reported to correlate positively with market participation (Davies, 1997). Livestock could also be used as collateral, although Binswanger and McIntire (1987) suggested that livestock was a poor form of collateral because it was prone to disease and the owner could move them to escape possible confiscation.

Cattle could also be used for draught power in farm operations such as ploughing and weeding, thereby increasing the size of land a household could cultivate (Kalinda *et al*, 2000). Cairns and Lea (1990) suggested that households owning livestock in KwaZulu-Natal prepared their fields by ox-plough and cultivated larger fields. According to these authors, apart from escaping from hardship and pain caused by relying on human power, an ox-plough was five times faster than hoe ploughing.

Livestock provided organic fertiliser required to increase productivity (Cairns and Lea, 1990). However, there was a social cost incurred in herding domestic animals since children, who should be at school, often performed this (Cairns and Lea, 1990). Animal herding near the village discouraged cultivation near the villages and therefore increased the travelling time to distant fields (Fenwick and Lyne, 1999). Therefore, a direct positive relationship between livestock ownership and sale of cash crops could hardly be supported. This is because the necessity for labour to herd livestock reduced the prospect of farmers opting for the two options simultaneously (Binswanger and McIntire, 1987; Makhura, 2001).

I. Off-farm Income

Authors have given many reasons why off-farm income enhanced market participation: (i) it enabled the household to access improved production technology; (ii) it improved smallholders' ability to secure and repay seasonal loans required to invest in agricultural activities; and (iii) it could help overcome a working capital constraint or may even finance the purchase of a fixed-investment type of innovation (Fenwick and Lyne, 1999; Masuku *et al*, 2001; Davies, 1997). Binswanger (1987) found that income transfers from relatives reduced risk-aversion behaviour because it insured against adversity. Therefore, families with employed members had more financial resources and were more likely to participate in agricultural markets. Other off-farm incomes included food processing, construction and repairing of houses, handicraft production and labour migration to cities in order to buffer household welfare from shocks (Anderson, 2003).

J. Ownership of Transport and Distance from the Market Place

Many researchers have found relationships between household ownership of transportation such as cart (Goetz, 1992), bicycle (Heltberg and Tarp, 2002) and pick-up truck (Key *et al*, 2000) and market participation. The reason is that households that owned these physical assets had lower transportation, communication and information costs and subsequently fewer obstacles to entering the market (Matungul, 2002). According to this author, farm gate prices decreased faster for every kilometer travelled, not simply because of increased transportation cost but also because of increased, information costs as well as losses of the products due to spoilage and damage.

Farmers near markets and on main roads could justify taking their products directly to markets because of reduced transportation costs and reduced time taken to carry the products to the market (Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003). Lyne (1996) reported that KwaZulu homeland wards furthest removed from markets and main roads were the poorest. Omamo's (1998) study in Siaya District in Kenya concluded that farmers' choice of food crop production with lower gross income than cotton was due to cotton's high transportation costs. The long distances to cotton marketplaces and bulkiness of cotton limited the transportation of large quantities.

2.2.5 Extension

A. Access to Extension Services

Participation in an agricultural scheme such as farmers' clubs, extension groups and contact with extension systems influences smallholder participation in agricultural markets (Masuku *et al*, 2001). Government can be involved in the provision of public goods related to extension and research that could stimulate smallholder cultivation and market participation (Delgado, 1999). However, outgrower schemes or contract farming takes extension as part of the business activity to guarantee yield, quality and marketing.

Traditionally, extension services from government and NGOs have focused on providing training and assistance to farmers in cultivation technology as opposed to marketing of outputs. Therefore, extension services should be capacitated to look for buyers, verify prices, terms and conditions of contract, and disseminate market information (Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003).

B. Market Information

Transactional communication is a persuasive dialogue, where seller and buyer attempt to convince each other over a period of time for each other's benefit until they arrive at a shared meaning. Smallholder farmers would only be able to influence their buyers if they had information about prices, products, marketing opportunities and trends. Knowledge was power while technical and marketing information was a productive element of human capital in farming (Delgado, 1999). Better decisions in a risky or uncertain world such as agricultural cultivation and marketing could easily be made if information that reduced uncertainty was available (Goetz, 1992; Anderson, 2003). Masuku (2001) found that access to (production and marketing) information measured as opportunity for radio listening and newspaper reading differentiated farmers selling more agricultural produce from those selling less.

Access to information also involved costs. This cost was related to the time and resources used to get information about prices, possible buyers and quantities. The cost of information was higher in regions with poor communication channels such as lack of radio, telephone, fax, internet and postal services, written channels and transportation (Poulton *et al*, 1998; Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003). The spatial characteristics of agriculture and the inherent heterogeneity of factors of

production entailed high costs of acquiring information and respective transmission to smallholders (Zaibelt and Dunn, 1998).

Technology, such as telephone and internet that provided up-to-date information, reduced the travelling and waiting time to search for information and subsequently tended to increase the efficiency of marketing activities (Coase, 1937; Anderson, 2003). Households with high literacy levels, better access to management and technical advice, and better knowledge of market opportunities would probably grow their operations more easily than those without (Delgado, 1999).

C. Agricultural Practices

Cairns and Lea (1990) found, in their study in KwaZulu-Natal, South Africa, that plots planted during October and November produced yields of 230 percent to 266 percent greater than those planted in December because of relative advantage in the absorption of water and nutrients. This suggested that farmers that planted early were more likely to sell crops because of greater yield than those that planted very late.

Use of crops resistant to adverse conditions and spatial diversification of fields were major tools for production risk management by smallholders (Makhura *et al*, 1997; Anderson, 2003). One key idea in diversification of farming activities was to find risk-efficient combinations of activities, or activities with reduced risk that could provide an acceptable return even during bad years (Anderson, 2003). However, smallholders also diversified to increase the efficiency of utilisation of labour, land, machinery and inputs. Diversification also increased productivity and cash flow and thus improved participation in agricultural markets (Anderson, 2003).

2.2.6 Agricultural Services

Agricultural services in this study referred to those agricultural operations, such as irrigation and agricultural mechanization that smallholders cannot peform themselves because of cost of equipments and the expertise needed. The explicit advantage of irrigation was to boost the productivity of land and water resources of the region. Irrigation also increased the value of land, made the dry season period more profitable, reduced the seasonality of agricultural production, improved the timing of the onset of agricultural activities, increased farm employment and gave a more assured level of crop production in areas with unreliable rains (Binswanger and Rosenweig, 1986, Anderson, 2003; Crow and Murshid, 1994).

Smallholder cultivation technologies in Sub-Saharan countries were simple and confined to hand tools and draft animals. However, utilisation of tractors (and draft animals) reduced demand for household farm labour (Binswanger and Rosenweig, 1986). Soil mechanisation services improved the cultivation of food and cash crops, mainly by affecting labour demand positively. Increased yields may also demand increased labour for harvesting (Binswanger and Rosenweig, 1986). That is, agricultural development may entail more advanced technology not just for soil preparation and weeding but also for harvesting.

2.2.7 Policies and Institutional Infrastructures

Legal institutions can also influence smallholders' participation in agricultural markets. Institutions are needed to offset the negative impact of transaction constraints (Matungul, 2002). The developing world is characterised by the absence of institutions that support agricultural marketing (Binswanger and Rosenzweig, 1986). Government is the main institution capable of influencing the institutional infrastructures that reduce transaction costs and marketing risk (Makhura, 2001). For example, institutional infrastructures reduce the incidence of opportunistic behaviours and bring trust as market participants create positive perceptions toward these institutions (Matungul, 2002).

Government could intervene through the promulgation of appropriate laws that would (Matungul, 2002):

(i) Set an ordered relationship (property rights, entitlements, scope of economic behaviour) between market participants.

(ii) Establish rules that would define the right to exchange property rights and legitimate contracts;

(iii) Legitimise institutions that would enforce the rules. Government intervention for contract enforcement was central to helping smallholders and institutions to manage risks (Anderson, 2003). Lawyers and courts that ensured compliance with contractual obligations and deterred opportunistic breach of contract should exist (Fafchamps and Minten, 2001).

(iv) Set mechanisms by which these laws and institutions could be adapted to changing economic and social circumstances.

Government was also needed to review legal and illegal taxes involved in business sectors. These are costs paid to have the right to perform business activities at a given place

(Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003). Where there were no good institutions, market participants incurred costs related to: (i) illegal taxes (bribes) to remove some marketing obstacles; (ii) alternative means of overseeing whether parties were fulfilling with obligations (Zaibelt and Dunn, 1998); and (iii) alternative means to enforce contracts (Fafchamps and Minten, 2001).

Where there were no trustworthy legal institutions claimants avoided high costs of legal action due to exaggerated lawyer's fees, bribery to agents of authority and opportunity costs of claimants' time. In some African countries, police and court clerks demanded sizeable payments before they could enforce the law (Fafchamps and Minten, 2001). Claimants also avoided delays by which the legal system handled the litigation issues up to compensation by using alternative means to legal institutions. Claimants were also concerned that perpetrators could easily circumvent the legal institutions in their favour.

Most alternative arrangements were based on social networks that involved social pressure to prevent breaking of formal or informal contract arrangement. These referred to the community, family, friends and/or organisations (Manussa, 2003). Social institutions played an important role in the resolution of disputes among market participants in places where the legal system and formal market institutions were non-existent or weaker. Binswanger and Rosenzweig (1986) noted that many cultural and traditional institutions reduced transaction costs. Some of the examples included:

(i) Use of trustworthy key people in village associations to provide input/loans for cashew production in Tanzania and guarantee the recovery of the loan (Poulton *et al*, 1998).

(ii) Use of local village tribunals to enforce the fulfillment of contracts in Bangladesh (Crow and Murshid, 1994).

(iii) Trust-based relationships as the dominant contract enforcement mechanism among grain traders in Madagascar (Fafchamps and Minten, 2001).

(iv) Collective punishment based on information shared within the business community (Fafchamps and Minten, 2001).

However, alternative institutions, arrangements and behaviours to reduce risks may increase the transaction costs, negatively affecting the growth of the marketing institutions and consequently limiting the improvement of agricultural markets (Fafchamps and Minten,

2001). Therefore, all the efforts by government and marketing institutions to set strong legal institutions could help improve the agricultural marketing of agricultural products. Government is also required to stimulate the emergence of marketing institutions by facilitating the construction of physical infrastructures.

2.2.8 Physical Infrastructure

Lack of adequate physical infrastructure was an obvious cause of high transaction costs and few analysts would dispute the need for improved roads, postal and telecommunication networks in rural areas (Lyne, 1996). Better roads and market infrastructures tended to reduce price variation across a larger regional area as they increased the mobility of goods, knowledge and information (Omamo, 1998; Matungul, 2002). The cost of transportation due to poor transport provision such as walking with load on the head or riding bicycles loaded with products could be reduced if roads were improved. This is because it would become possible to use vehicles with more speed and larger carrying capacity.

Positive change in physical infrastructures helped create conditions that induced private investment in the area of transport vehicles, shops and storage facilities, thus bringing the market closer to smallholders (Matungul, 2002). Transport costs affected marketers. However, they passed these costs on to smallholders in the form of reduced farm gate prices and high input or agricultural services costs; and to the consumers by selling them expensive agricultural products. This situation was very characteristic of Africa where consumer prices could be 75 percent higher than the farm gate price (Fafchamps and Minten, 2001). Transport costs also affected farmers' business due to increased costs. Smallholders would sell where they would incur lower transportation costs (Masuku *et al*, 2001). However, poor population density due to dispersed villages, poor industry, commerce and services reduced the return of investment in infrastructures (Binswanger and McIntire, 1987). Many developing countries in Sub-Saharan Africa had too little public money to develop infrastructures that could improve marketing of agricultural products (Anderson, 2003).

2.2.9 Availability and Access to Market

The public-sector provision of agricultural supplies and marketing is largely a thing of the past in Sub-Saharan Africa (Stringfellow *et al*, 1997). However, the private sector has not yet filled the gap left by the state after the structural adjustment programmes of the late 1980s (Stringfellow *et al*, 1997). Smallholders have been left with difficulties in accessing

inputs, services, credit and outputs markets (Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003). This missing market created structural constraints that revealed themselves in the form of transaction constraints. These constraints prohibited farmers from participating in agricultural markets (Delgado, 1999). Below are some considerations about inputs, agricultural services, financial and output markets. Alternative market arrangement institutions such as interlinking and farmers' associations are also reviewed.

A. Input Market

Inaccessibility of seed, fertilisers and plant protection inputs are reported to hinder yields. Use of poor quality seed does not enhance crop yields while use of high yield varieties significantly increase yields (Key *et al*, 2000). Cairns and Lea (1990) reported that smallholders in KwaZulu-Natal increased their yields by 65 percent when they used improved seed as opposed to traditional seeds. However, introduction of higher yielding varieties needs a careful consideration of aspects related to taste, storage quality, and resistance to drought, pests and diseases (Smale, 1995; Cairns and Lea, 1990; Anderson, 2003). It is probable that crop yields cannot be increased without use of mineral fertilisers (Cairns and Lea, 1990). However, recommendations for fertiliser use need to be based on sound financial and environmental analysis so that it is a sustainable and profitable technology.

Poor access to inputs affected the supply response of agricultural markets even if smallholders had a positive perception of cash crops due to good prices, increased demand and good extension support (Havens and Flinn, 1961; Poulton *et al*, 1998). Input package provision to smallholders in the 1970s was a strategic government option to improve smallholder market participation (Goetz, 1992). However, after structural adjustment economic policies of the 1980s, governments retreated from direct intervention in input provision, leaving this to private operators in agribusiness (MAP/MSU Research Team, 1996). Consequently, the aggregate use of inputs by smallholder farmers (for food and cash crops) declined in many Sub-Saharan African countries (Poulton *et al*, 1998). According to Jeje *et al* (1998) and Poulton *et al* (1998) the private sector did not emerge to take on the role of distributing inputs because of: (i) the poor demand for inputs due to high input costs; (ii) high costs of transportation and distribution of inputs in dispersed villages; (iii) lack of

skilled and experienced traders to manage agrochemicals; and (iv) the seasonal nature of the business.

C. Credit Markets

Where there was shortage of income, mainly from off-farm sources, smallholders needed financial support to buy inputs and hire services to improve cultivation and marketing activities. For example, groundnut farmers attached significant importance to access credit as a strategy for the revival of groundnut production and markets in Niger (Farson-Baidu *et al*, 1997).

Most agriculture banks serving smallholder farmers after independence in Sub-Saharan African had collapsed because of lack of collateral, high transaction constraints, seasonality of agricultural business, small financial market size, high default rates and poor management (Farson-Baidu *et al*, 1997). Most developing countries lacked financial institutions that could provide loans to smallholders to pay for inputs and services; and to traders so that they could offer competitive services in supplying inputs, agricultural services (soil preparation and irrigation provision services), and buying of smallholders' outputs (Poulton *et al*, 1998).

However, financial institutions required collateral, debt repayment capacity and low transaction costs (Fenwick and Lyne, 1999). Local (indigenous) collateral was often unacceptable because of its form and low value. In addition, unstable and weak institutional infrastructures could not enforce repayment (Poulton *et al*, 1998; Anderson, 2003). Further, proper screening of smallholders hardly materialises because of assessment difficulties over yields, bad debts, and high assessment costs from dispersed villages and fields (Binswanger and Rosenweig, 1986). Furthermore, farmers in many Sub-Saharan African countries have been used to treating loans as gifts for decades, often encouraged by local politicians, and have not yet changed their attitudes to reflect the new reality of liberalised markets (Poulton *et al*, 1998). These constraints increased the risk aversion of financial institutions. The private sector could only emerge if provision of credit to smallholder farmers became less risky and more profitable (Anderson, 2003). Therefore, strategies to reduce risk and increase profit of credit businesses were of paramount importance for improving market participation by smallholders.

Binswanger and Rosenweig (1986), Crow and Murshid (1994), Farson-Baidu *et al* (1997) and Anderson (2003) have suggested some innovative strategies required to alleviate the concerns faced by financial institutions:

(i) Smallholder diversification of farm and non-farm activities that could help the build up of financial reserves which would allow repayment of loan;

(ii) Institutional diversification of loan products to include farm and non-farm credit, rural and urban areas; and institutional diversification in various agro-climatic regions to reduced the negative aspects of seasonality of agricultural activities on credit demand;

(iii) Linking formal and informal local credit and savings organisations. Formal institutions could provide credit to informal organisations that were less likely to default. These informal local credit organisations then could provide credit to smallholders as individuals or groups. The supply of inputs or credit through local traders, who are knowledgeable about prominent individuals and networks within the villages, have provided a clear comparative advantage in ensuring repayment of loans (Poulton *et al*, 1998). That is, by providing loans to local traders, formal financial institutions could channel seasonal finance to smallholder farmers without themselves incurring the costs of screening and monitoring;

(iv) Use of a third party guarantor, who is perceived as less risky by the lending institution to guarantee repayment in case smallholders default. Donor institutions could provide some form of guarantee to credit institutions to provide credit for agricultural inputs and services, and to guarantee funds for buying smallholders products (Poulton *et al*, 1998);

(v) Threat of loss of future borrowing opportunity could also reduce default rates. This strategy could only work if the farmers were limited in terms of mobility and if different lenders shared information about defaulters;

(vi) Link inputs to credit, buying and repayment;

(vii) Use of microfinance techniques that used much higher interest rates to cover the high costs of collection and high default rates were also recommended (Anderson, 2003).

D. Output Market and Processing

Liberalisation of global markets has created many new export opportunities but many countries in Africa still find it difficult to develop marketing networks involving smallholders (Stringfellow *et al*, 1997). Lack of access to output markets could reduce smallholder income to zero (Farson-Baidu *et al*, 1997). Masuku *et al's* (2001) study showed that previous experience with marketing channels improved smallholder market participation. Smallholders were likely to use those marketing channels with which they had good experience and had developed mutual trust. Access to output markets was essential for increasing smallholder participation in agricultural markets.

Most high value products such as horticultural crops were characterised by a high ratio of transaction constraints to final values because of high degrees of processing embodied in such items and because of quality requirements (Binswanger and Rosenzweig, 1986; Delgado, 1999). Cultivation of these crops tended to increase smallholders' income but poor households could have more difficulty diversifying into profitable new crops than wealthy ones (Delgado, 1999).

Private companies were reluctant to develop markets for smallholder outputs because of low volume of outputs and reduced business efficiency (Matungul, 2002). There were also constraints involved in collecting smallholders' outputs from dispersed villages. Other constraints were related to cleaning of the products to ensure quality and also packaging, storage, processing, transportation and handling (Zaibelt and Dunn, 1998; Ministério de Industria e Comércio and Ministério de Agricultura e Desenvolvimento Rural, 2003).

In addition, the costs involved when searching for suitable partners to ensure quality products also affected the marketing of output from smallholder. Poor quality was a major concern for products from African smallholders (Zaibelt and Dunn, 1998). Fafchamps and Minten (2001) reported that more than 44 kg per ton (4.4%) of agricultural products delivered to some traders in Madagascar were of poor quality. In order to prevent the purchase of poor quality products, these traders inspected the quality of goods purchased in almost every transaction.

Improving African smallholders' access to markets on a large scale required institutional innovation beyond traditional state schooling and extension services (Delgado, 1999). Delgado suggested that promoting growth through increased participation in growing world markets for high-value items would require significant vertical integration of smallholders into processing and marketing firms. Due to lack of institutional infrastructures and market institutions, many firms have developed sustainable agribusiness activities through more sophisticated market arrangements. The most important of these were the contract farming and farmers associations' arrangements as discussed below (Anderson, 2003):

E. Contract Farming Arrangements

Contract farming or outgrower schemes involved a promoter that provided inputs, services (mechanisation and irrigation), credit and extension in exchange for smallholder outputs (Porter and Philips-Haward, 1997). Generally, smallholders in contract farming provided labour and tools and, depending on type of arrangement, they may provide or be provided with land (Porter and Philips-Haward, 1997).

The contract or arrangement stipulated the obligation for farmers to sell all the outputs of certain quality at a pre-agreed or non-agreed price to the buyer (Delgado, 1999; Anderson, 2003). Often the company costs, profit and loan interest were deducted during the buying process. In many schemes, the promoter maintained a nucleus state (a farm managed by the company) that guaranteed production and supplied part of the company's requirements (Porter and Philips-Haward, 1997).

Contract farming was acknowledged to facilitate input, services, and credit and output markets to smallholders where there were missing markets (Poulton *et al*, 1998; Delgado, 1999). Extension was usually part of the service provided, typically at a higher rate (more frequently) than the public extension (Delgado, 1999). The advantages from the promoter's side included the following (Crow and Murshid, 1994; Delgado, 1999):

(x) Assured supply of the commodity at harvest at a fixed price;

(xi) Better quality control than if the products were collected from independent smallholders;

(xii) Option of making collateralised loans to the farmers;

(xiii) Better relations with local communities than when operating a large farm;

(xiv) Avoid the expenses, large management requirements and risks of investment involved with large farms;

(xv) Save on monitoring and selection problems related to loan provision to smallholders.

Contract farming was likely to remain an important –indeed growing – feature of rural Africa for the near future (Porter and Philips-Haward, 1997). Contract farming has been accepted by the donor community as the right strategy for solving the problems of input, agricultural services, credit, extension and marketing of smallholder outputs (Porter and Philips-Haward, 1997). Smallholder farmers on most contract farming schemes have been more content due to the regular and guaranteed output markets, and access and availability of inputs, agricultural services and credit markets (Porter and Philips-Haward, 1997).

In spite of advantages, the imbalanced distribution of benefit because of the imbalance of power between smallholder farmers and marketers had a negative effect on agricultural market development in the long term (Crow and Murshid, 1994). This excessive power led to an adverse situation that consisted in the transfer of the majority of the risks from better-off market participants (the agribusiness companies) to the most vulnerable participants (the smallholders) (Crow and Murshid, 1994). Promoters controlling the contract farming scheme may offer to smallholders a lower price when they expect a better price in the future (Crow and Murshid, 1994). Because of their weak position, smallholders had little means of forcing the promoters, already in a stronger position, to pay fair prices for their outputs leading to frustration, bitterness and sometimes open arguments (Crow and Murshid, 1994).

However, market institutions involved in alternative market arrangements with smallholders also had a number of disadvantages. For, example, with liberalised markets buyers were allowed to compete for farmers' outputs and it was becoming more difficult for promoters who had provided agricultural services to guarantee the recovery of their costs during the buying process (Poulton *et al*, 1998). An opportunistic farmer may sell his output to a buyer other than the supplier of inputs, services, credit and technical assistance to avoid deductions of input-credit. The likelihood of such opportunistic behaviour increased when the promoters delayed buying or where a second buyer offered higher prices (Poulton *et al*, 1998). The problem was aggravated because of the lack of legal systems to enforce the contracts.

On one hand, promoters would continue in the contract arrangement if they were able to recover their investment with interest. On the other hand, smallholders needed to know not only that they were gaining a good income but also that they were not being cheated of further profits by company maneuvering that consisted in offering low price to smallholder (Porter and Philips-Haward, 1997; Poulton *et al*, 1998). To minimise the incentives for opportunistic behaviours, Poulton *et al* (1998) suggested the following:

(i) Restriction in competition by contract farming companies for the same products mainly while there was still a lack of markets. Companies in Ghana restricted competition by opting to offer a common cottonseed price, competing instead on quality of service and non-price incentives (Poulton *et al*, 1998). However, as result of lack of competition, the cottonseed price dropped, smallholders diverted companies' inputs to other profitable crops such as peanuts, and subsequently they reduced cotton supplies in preference for peanuts. According to Poulton *et al* (1998) this was a controllable situation as market forces may act to restore equilibrium over the medium term by companies reconsidering their price incentive;

(ii) Sharing of information about the identities of shirking or side-seller farmers between promoters could also minimise defaulters. Poulton *et al* (1998) reported a successful case of information sharing in Pakistan between promoters that provided input loans to farmers for cotton production; and

(iii) Concession rights could also be given to a certain company. Concession is a legal monopoly over markets. The company were given the legal right to be the sole promoter and buyer for a certain crop in a given region in order to recover their agricultural inputs, services, loans, the costs of extension and technical assistance provided. The company costs for input and service and related interest were subtracted from the sum paid to the farmer during the buying process (Poulton *et al*, 1998). Concessions also allowed a promoter to assemble a large volume of raw material required to maintain the functioning of the industry at an efficient level. This encouraged promoters to provide services in order to guarantee the production volume. At the same time it gave the farmers, mainly those organised into associations, increased bargaining power as the promoter became dependent on their outputs. However, concession arrangements should be seen as temporary in the face of imperfect markets as they reduced

competition. The arrangement acted as a formidable barrier to entry for third parties and was thus a source of additional monopolistic power for dominant companies in such transactions.

Delgado (1999) and Porter and Philips-Haward (1994) suggested some key strategies for improving participation of smallholders in the contract farming scheme:

(i) Improve relationships between growers and the company by involving local educated people in management as opposed to involving outsiders as managers. Outsiders had limited knowledge of the local language and cultures. The leadership of a growers' association could represent farmers' interests.

(ii) Avoid farmers' dependency on the contract farming scheme. Contract farming supporters (donors, government and NGOs) should allow and advise growers to commit only part of their resources to the scheme to reduce dependency. The scheme should allow the farmers to intercrop or use part of their land and resources to cultivate other cash crops or food crops. Otherwise, food shortages at the household and local level would force up local food prices and obscure the benefit of an income from contract farming.

(iii) Pay to the producers directly as opposed to paying household-heads, particularly in the case of women producers. Porter and Philips-Haward (1994) reported a case where women worked all year on cane plots, yet their husbands collected the cane money from the mills at the harvest and retained control of the funds. This situation created a disincentive to producers that resulted in their withdrawal and concomitant reduction in production.

(iv) Encourage collaboration between farmers and management in the monitoring of quality standards. Porter and Philips-Haward (1994) reported that mill statements have been a contentious issue in cane schemes in KwaZulu-Natal, South Africa because of poor collaboration in relation to quality control between the company and the producers.

(v) Have control of land and irrigation schemes in order to balance the power relationships between smallholder farmers and promoters. Where farmers had total legal authority over their land they did not have the obligation to implement the recommended practices to remain in the scheme. However, in some schemes the control of land and irrigation schemes encompassed control and direction of the smallholders farming behaviour, conduct and discipline in the scheme. In

such schemes, smallholders must undertake to adhere to instructions and advice given by the extension officers. These officers had and retained the right at all times to inspect fields to see whether the recommendations were being implemented.

(vi) Provide good working conditions and income to hired labour in the growers' fields in order to increase their satisfaction and motivation and to guarantee the sustainability of the scheme.

F. Farmers' Associations

An association is a business organisation in which the same group of people own, control and use the services, as members of the organisation. From a social justice perspective, an association is a means of satisfying social needs, such as a need for education and health (Stringfellow *et al*, 1997). Farmers' associations were widely believed to be one of the mechanisms for:

(i) Improving smallholder access to agricultural markets (Christy, 2001);

(ii) Facilitating the collection of farmers' outputs and purchasing and distributing inputs in a liberalised market (Poulton *et al*, 1998; Matungul, 2002);

(iii) Allowing a promoter to sign one contract with a group of farmers instead of contracts with individual farmers;

(iv) Reducing information, product collection and marketing costs (Key *et al*, 2000); and

(v) Facilitating quality control, packaging and storage of the products (Matungul, 2002).

From donor, government and NGO perspectives, it was much easier to distribute project resources to a group of farmers rather than to individuals (Stringfellow *et al*, 1997). Farmers' associations could realise the scale-economies of bulk acquisition and supply, enter into better bargaining positions with traders and form interest and pressure groups capable of articulating demand through collective action (Smale, 1995; Stringfellow *et al*, 1997). By pooling resources to invest in transport or processing operations, farmers' associations could also become more active market participants (Stringfellow *et al*, 1997).

This rosy side of what farmers' associations could do has influenced the design of many agricultural development projects to the point that donors have often made association development a prerequisite for funding (Stringfellow *et al*, 1997). Many governments

granted farmers' associations special privileges, lines of credit, technical and sometimes promotional support (Christy, 2001). However, there was growing evidence that projects promoting farmers' associations did not always lead to emergence of viable farmers groups that alleviated market constraints (Stringfellow *et al*, 1997; Christy, 2001).

A summary of some of the aspects influencing farmers' associations' performance in fulfilling their primary functions was provided (Stringfellow *et al*, 1997; Poulton *et al*, 1998; Delgado, 1999; Christy, 2001):

(i) The demand for farmers' association development by donors often exceeded members' management skills given the low literacy rates and lack of management experience that constrained the transfer of skills.

(ii) Farmers associations' animation process was costly and time consuming. These constraints affected the spread of farmers' associations in a given region. However, pressure by government, donors and NGOs to expand farmers' associations often resulted in weak farmers' associations in terms of coesion.

(iii) Promotion of businesses that were very demanding in management activities was less likely to produce strong farmers' associations. For example, coordination of marketing activities and group borrowing required far less management ability than managing a jointly owned transport or central processing facility.

(iv) Donated assets often had quite a perverse result. Farmers' associations should be encouraged to obtain assets through collective contribution and exchange arrangements with business partners rather than expect donations and subsidies from NGOs, donors and government.

(v) Externally influenced farmers' associations by politicians that try manipulate the group by favouring access to resources, and donors as well as NGO driven farmers' associations had a negative effect on association development. Internal cohesion and a clear member driven agenda was central to successful farmers' associations. Cohesion was likely to be secured by small, homogenous groups that already shared common agendas.

(vi) Weak business orientation and poor relationships with the private sector also resulted in weak farmers' associations. According to Stringfellow *et al* (1997) linkage-dependent relationships between promoters and farmers' associations should be favoured over the linkage-independent relationship, most often suggested by the government, donors and NGOs. The linkage-dependent

associations, although dependent on external business agencies and therefore with a low bargaining position, benefited associations from the management and entrepreneurial services provided by this external business agent. In addition, the agent could use its own financial resources to build the association's capacity as part of furthering its business activities. The linkage-independent relationship should rather be seen as a long-term objective once the group has gained management and entrepreneurial skills and experience.

(vii) Farmers' associations in Africa have failed because of difficulties in holding management accountable to the members, leading to inappropriate political activities or financial irregularities in management (Delgado, 1999).

2.2.10 Risk and Uncertainty about Market Participation

Smallholders were exposed to risks from many different sources: from the production process with its negative impact on yields (see above), and from markets due to price instability, inaccessibility of reliable buyers and high transaction costs (Binswanger and Rosenzweig, 1986). Farmers' efforts to avoid risks through on-farm management practices tended to reduce the average yields that led to a small supply of a riskier agricultural commodity (Anderson, 2003).

The perceived risk was defined as the uncertainty that the smallholders faced when they could foresee the consequences of their decision to cultivate and market a given cash crop (Schiffman and Kanuk, 1987). Legal uncertainty due to poor institutional infrastructures was also an important source of market uncertainty or risks (Lyne, 1996). Uncertainty implies a lack of predictability of the future (Rogers, 1962). Cultivation and market participation involved some degree of uncertainty or unpredictability that affected smallholder decisions on whether to participate in agricultural markets. In general, the more risk averse a farmer was, the less likely s/he was to decide to participate in agricultural markets because aversion was a defense mechanism that rejected an activity perceived as high risk (Kashem, 1988). It was generally accepted that risk behaviour and market participation affect each other. By participating in agricultural markets, smallholder farmers gathered more information, became more knowledgeable of the market, and subsequently reduceed their uncertainty (Zaibelt and Dunn, 1998). Reduced levels of uncertainty would lead to further participation in agricultural markets.

2.3 Summary

Factors influencing market participation could be grouped into: (i) agro-ecological and natural resources, (ii) household socio-economic, (iii) research & development and extension, (iv) agricultural marketing policies and institutional infrastructures, (v) physical infrastructures, and (vi) availability and access to agricultural markets. The influence of these factors to market participation was complex and often indirect. The isolated or combined effects of the factors above determine other aspects that also influenced market participation such as:

(i) Total production, the production allocated for household consumption and the production (resources) allocated for cash crops;

(ii) Farm gate prices and the costs of inputs and agricultural services. Transaction barriers that affected the farm gate prices, costs of cultivation and marketing; and

(iii) Cultivation and marketing risks that influenced farmers' decision to cultivate or to participate in agricultural markets.

Figure 2.1 presents a framework of factors influencing market participation and interaction among the factors based on the understanding of this review of literature. Factors are reflected as those based on agro-ecological resources (pale blue), household characteristics (green), extension (pink), policies (blue), physical infrastructures (red), and availability of markets (orange). Nesting amongst these factors are those relating to risk, transaction costs, decisions and costs. This framework rests on the availability of food crops and profitability leading to market participation (lilac/purple). Interaction between factors and market participation is usually present. For example, within households' socio-economic factors, field size was likely to be the most important factor because it influenced production. In addition, most of the remaining socio-economic factors were reflected in the size of the cultivated fields.

In many areas of Sub-Sahara Africa such as in southern Niassa, cultivation problems have not been solved and farmers were less likely to participate in agricultural markets because they could hardly produce even enough to supply household consumption needs. Therefore, agricultural market research for improving smallholder participation in agricultural markets should look not only at factors affecting the marketing of smallholders' outputs but also needed to look at aspects that affected cultivation.

The complexity of interaction between factors affecting market participation showed the complexity of the milieu in which smallholders make decisions. Decisions to participate in an agricultural market were based not only on profit considerations but also on social factors (Nji and Sama, 1987). Some decisions were systematic and based on societal experience gained through traditions. The decisions influencing smallholders' participation in agricultural markets were hard to systematise given the complexity of factors involved. This complexity could increase in a dynamic development process where smallholders and institutions were adjusting to changing socio-economic and environmental (physical, political, institutional, and market) factors (Paarlberg, 1993). In an active development process, new obstacles would emerge as the former ones were removed.

This study relied on perceptions, knowledge and experience of smallholders to identify and interpret the factors influencing market participation. The success of an agricultural development programme could be determined by smallholders' ability to identify the constraints influencing their participation in agricultural markets (Schiffman and Kanuk, 1987). It was much more practical (and easier) to ask the farmers (and other market participants) to report the factors influencing or that could influence their participation in agricultural markets than trying to assume these factors and strategies. Smallholders had information available that was important for planning a good market development project. As argued by Hope and Timmel (1984) real development strategy was borne of need as felt by the people. This is because behind a need there was motivation, the driving force within an individual that impelled to the action to satisfy cash and food security (Schiffman and Kanuk, 1987). The following chapter provided a description of the location of this study.

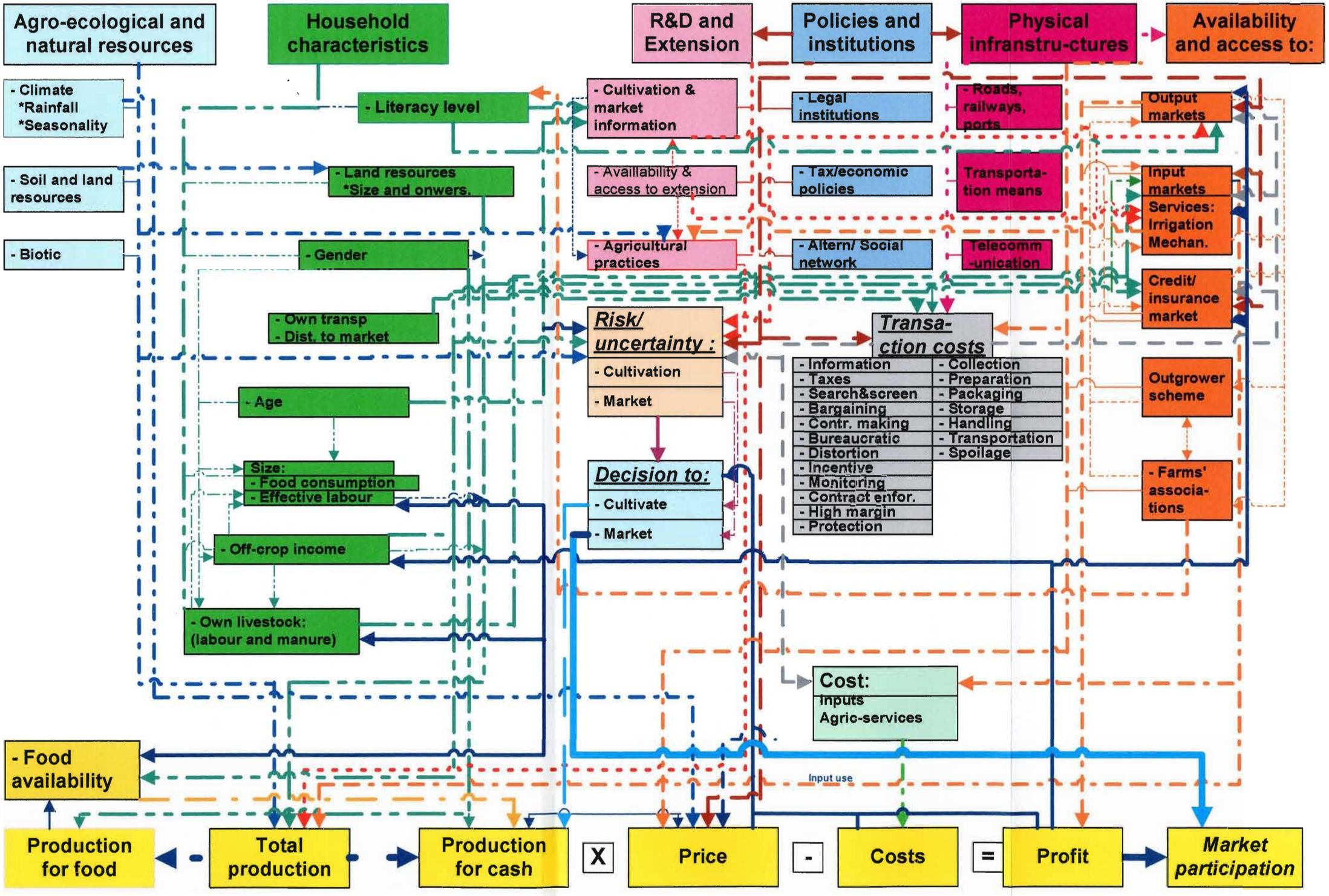

Figure 2-1. Factors and related interactions affecting smallholder participation in agricultural markets.

CHAPTER 3 : DESCRIPTION OF THE STUDY AREA

3.1 Introduction

This study was motivated by the desire to understand the factors and strategies influencing smallholder cultivation decisions and agricultural market participation in order to improve food and income security. This chapter describes farming in southern Niassa relating to: poverty levels, economy, farming systems, social and physical infrastructure, agricultural markets related to outputs, inputs, agricultural services (irrigation and agricultural mechanization services), credit and the extension system. Information discussed in this chapter suggests potential factors (past and present) influencing smallholder cultivation decisions and participation in agricultural markets. This description has also provided an indication of the successes and failures of different strategies used or being used to improve smallholder market participation in southern Niassa. Subsequent chapters of this study use information from this chapter for the interpretation of the findings of this research. In particular, Chapter 6, Chapter 7 and Chapter 8 have summary descriptions of the study area.

3.2 Locality and Population

Geographically the research focused on southern Niassa, Niassa province, Mozambique[2]. Figure 3-1 shows the map of the province and districts representing southern Nassa. The term southern Niassa does not mean that all the districts are in the south. However, they represent similarity in terms of agro-ecological, economic and political characteristics. The region depends on Cuamba City where the majority of the institutions that influence the agricultural markets of the region are based. The whole region is home to 61 percent of the province's population and comprises more than 39 percent of the area (Table 3-1). The average population density for southern Niass is 13 people km^{-2} compared to seven people km^{-2} for the province and 22 people km^{-2} for Mozambique (Instituto Nacional de Estatística, 2001). Land resources does not represent a restriction for the majority of population in the Agro-ecological zone number 7 where southern Niassa is part (Ministério de Agriculture e Pescas , 1996). In addition, there is plainty of land in Niassa. In the early 1980s, the government of Mozambique attempted to forcely reallocate people (known as "os improductivos") from central and south of Mozambique to Niassa in order to occupy the vast land resources of province for cultivation.

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2 *Mozambique was divided into 10 provinces. Each province was divided in districts. Niassa provinces had 15 districts. Southern Niassa, which was part of Niassa province, comprised eight districts. Each district had a city (See figure 3-1). The district was divided into administrative posts, and the post was divided into localities. The locality was divided into villages.*

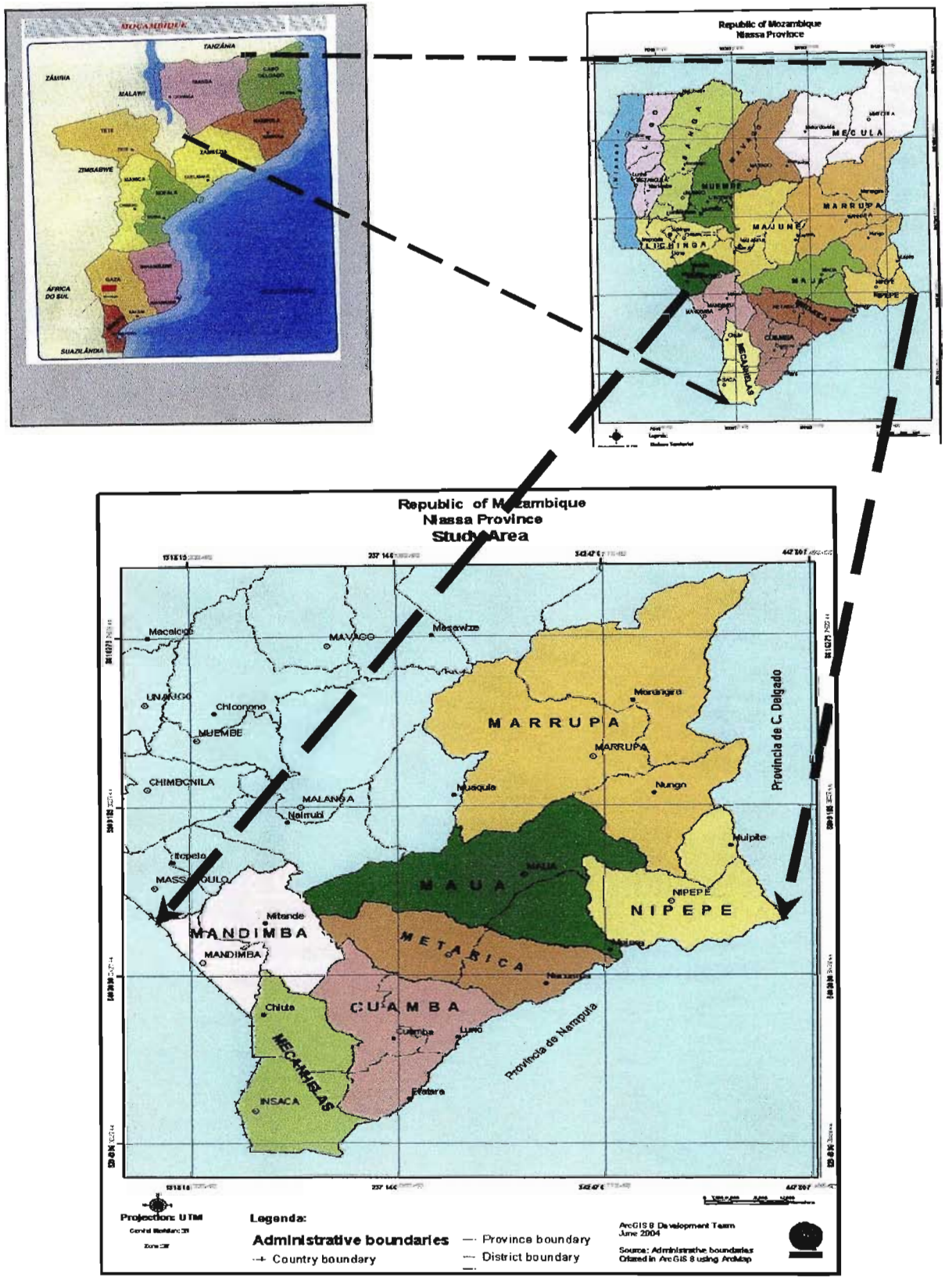

Figure 3-1. Map of Mozambique, Niassa Province and southern Niassa districts (Source: Instituto Nacional de Investigação Agronómica, *2004).*

Table 3-1. Population, area and population density of southern Niassa (Instituto Nacional de Estatistica, 2001).

Districts	Population	Area (km^2)	Population density (People/ km^2)
Cuamba	166005	5374	31
Mecanhelas	85701	6406	13
Mandimba	99939	4385	23
Metarica	25931	3489	7
Maua	35365	9975	4
Nepepe	27133	3292	8
Marrupa	46575	17731	3
Total/Average	486649	50652	13
Percentage for the province (%)	61	39	

3.3 Brief History of Mozambique

Recent history of Mozambique influencing agricultural markets can be divided in three eras: colonial, post-independence and post-peace agreement eras. The colonial era was based on the market economy. Over the years the Portuguese administration developed physical infrastructures such as rural shops, roads and railways that connected smallholders to big cities and ports. Industrial cash crops such as cotton were promoted based on contract farming involving concession rights. Rural shops onwed by Portuguese served as distribution points for inputs and collection points of smallholder outputs, including food cash crops.

The second era came after independency of Mozambique from Portugal in 1975. After an extended period of guerrilla fighting conducted by FRELIMO and political turbulence in Portugal in April 1974, Portugal was forced to give independence to Mozambique in June 1975. In the aftermath of independence, there was mass departure of Portuguese and Asian traders, leaving behind more than 2000 commercial infrastructures (Bias and Donovan, 2003). This exodus disrupted agricultural cultivation and marketing system of Mozambique. Independence also brought changes in the type of economic system that affected agricultural development, changing it from a market oriented economy to government-centralised intervention. The government of Mozambique recovered some of the infrastructures, and started new and large agricultural development programmes with public investment and support from Mozambican Nordic Agricultural Programme (MONAP). In the 1980s the centralised system was showing its weakness, which forced the government to

adopt the Economic Rehabilitation Programme in 1987. However, the civil war of the 1980s between the government and RENAMO (Resistência Nacional de Moçambique) constrained this economic reconstruction process (MAP/MSU Research Team, 1996; Tickner *et al*, 2001).

The third and recent era of Mozambique started with the signing of peace agreement between the Government and RENAMO in 1992 and the multiparty system instituted through universal suffrage in 1994. This era is characterised by consolidation of peace and Economic Rehabilitation Programme started in 1987. Clear definition of the socio-economic policy and programmes by the government with donor and investor supports; major intervention by donors and NGOs to change the standard of living of the rural poor and smallholders; and increased agribusiness interest by private institutions were the activities that followed (Pontara, 2000).

3.4 Poverty Levels

Absolute poverty is the inability to attain the minimal standards of consumption to satisfy basic physiological needs or not having enough to eat (Manussa, 2003). Niassa was the fourth poorest province (70.67%) after Sofala (87.9%), Inhambane (82.6%) and Tete (82.23%). Niassa poverty level was slightly above the average for Mozambique (69.37%) (Pontara, 2000). The poverty level in Mozambique was more pronounced in rural areas (71.25%) than in urban areas (62.01%) (Pontara, 2000). Pontara (2000), however, did not provide comparative data between rural and urban at provincial level. It is expected that rural poverty in Niassa province will be higher than the average for Mozambique. Most of the agricultural programmes and policies[3] in Mozambique aimed to address the reduction of absolute poverty, the most pressing problem for humanity (Agunga, 1998).

Smallholder farmers needed money to buy oil, milk, meat and other foodstuffs to complement the typical maize and bean based diet. Given the insignificance of other income generating activities, it was anticipated that agriculture would allow a more diversified diet from either own food crop production or through agricultural income (Bias and Donovan, 2003). The famine pattern in southern Niassa was cyclical, being high during January and

[3] *PARPA = Action Plan for Reduction of Absolute Poverty (2000 – 2004); PROAGRI = Programme for Rural Development; NEPAD = New Partnership for African Development; EC = Commercialisation strategies; PDAN = Programme for Agricultural Development of Niassa; Programme Avante Niassa; PAMA = Programme for the support of agricultural markets; PROANI = Program Avant Niassa.*

February when people reduced the number and size of meals and resort to wild p survival. Niassa province presented a low birth weight rate of 12 percent. This larger than the acceptable maximum rate of seven percent (Instituto National de Estatistica, 2001). Low birth weight gives an indication of child malnutrition that is a consequence of poor maternal nutrition and of the household in general. Famine is, in part, a result of an inefficient agricultural production and market system, and general poor economic development.

3.5 Economy

The colonial government aimed at increasing cotton production in southern Niassa. After independence in 1975, agricultural production dropped dramatically due to the disruption of agricultural cultivation and marketing because of the withdrawal of trading companies. For example, cotton production dropped from 83 000 tons in 1973 to 19 000 tons in 1988 while food cash crops experienced a drop of 50 percent in Cabo Delgado and Nampula provinces (MAP/MSU Research Team, 1996). This drop had a negative impact on smallholders' gross income and the country's economy. Attempts to revitalise the economy did not succeed because of poor management and the war that ravaged the country. With the Economic Rehabilitation Programme in 1987 and the end of civil war in 1992, Mozambique recorded one of the highest economic growth rates in Southern Africa (7% in 2003) (Bias and Donovan, 2003). Agriculture represented 28 percent of national GDP in 2003 followed by commerce (22%), transport and communication (11%), and other services (39%) (Instituto National de Estatistica, 2001). Southern Niassa continued to contribute to cotton output, an important export product in Mozambique (Instituto Nacional de Estatistica, 2001).

Increased areas under cultivation due to increased numbers of smallholders that entered cultivation after the peace agreement, successive good harvests and improvements in agricultural markets stimulated agricultural growth (Tickner *et al*, 2001, Manussa, 2003). PAMA (2003) reported that 61-73 percent of the households in southern Niassa participated in agricultural markets compared to 29 percent for Mozambique reported by Heltberg and Tarp (2002).

3.6 Farming and Cropping System

Eighty percent of the population was involved in agriculture for food production and income generation (Carrilho *et al*, 2003). Non-agricultural coping (survival) strategies were quite insignificant (PAMA, 2003). Unlike Southern Mozambique where people found

employment in South Africa, in the north people were between countries that could hardly absorb more migrant workers. The sale of labour to neighbours was the main coping strategy. Other income generating activities included trading, sale of local construction material, firewood, handcraft and processed food. In desperate situations, households scavenged by hunting, fishing or collecting wild products (Tickner *et al*, 2001). Carrilho *et al* (2003) suggested that most non-agricultural income depended on agriculture. Smallholders also raised a small number of goats, lambs and chickens for direct consumption and sale (PAMA, 2003). Still, livestock was a complementary activity to crop cultivation (Tickner *et al*, 2001). An analysis of the cropping system could provide an understanding of the constraints and opportunities for improving smallholder participation in agricultural markets.

3.6.1 Land, Topography and Soils

Land, the primary resource for agricultural production, was not a limiting factor in southern Niassa. The population density was still low (13 people km^{-2}) and Mozambican law recognised traditional land use and granted usufruct rights for land based on occupation. The majority of soils were appropriate for agriculture (Jeje *et al*, 1998; Tickner *et al*, 2001). The soils had good physical characteristics and there was an undulating topography ranging between zero and eight percent. The altitude of most land was between 600 and 1000 meters (Tickner *et al*, 2001). However, the soil nutrients were low because of a large capacity for phosphate fixation, depletion of Nitrogen (N), Potassium (K) and organic matter. Inadequate replenishment of nutrients due to removal from harvest and erosion aggravated the availability of nutrients of soils in southern Niassa (Bias and Donovan, 2003). Smallholders resorted to shifting cultivation (cultivation-fallow-cultivation) to rebuild the fertility of their soils. They left their land fallow for four years after six years of cultivation. Often they moved and settled on farms far away from their original villages in search of fertile land (Bias and Donovan, 2003). Some farmers had dambos soils used during dry seasons. On average, households had two to 2.5 fields in different locations in order to reduce risks. The average land cultivated per household was about 2.27ha and 2.45ha in Maua/Marrupa and Cuamba districts respectively (PAMA, 2003).

3.6.2 Climate and Rainfall patterns

Southern Niassa was part of Mozambican Agro-Ecological Zone number 7 along with some area of Cabo Delgado and Nampula provinces (Ministério de Agricultura e Pescas, 1996; Jeje *et al*, 1998). The division of agro-ecological zone was based on climate, soils and crops

potentiality. The annual rainfall was about 800 - 1100mm, falling between November and April (Figure 3-2). This period represented the growing period, the time of the year when moisture supply from rain and soil reserve could be considered adequate for crop growth (FAO, 1981). The other period between May to October was the dry period, the period when moisture supply from rain and soil storage was less than 50% of total evapotranspiration (FAO, 1981). During this period, smallholders were involved in other activities such as sellng of local construction material, firewood, handcraft, and building activities. Few farmers cultivated vegetables (2%) during the dry season because of lack of adequate surface water in the region during dry period (Lukanu *et al*, 2004). This seasonality determined food and income security of the smallholder farmers. The rainfall pattern was of low variability. However, an extended dry period of more than 25 days between January and February could affect the yields of late crops such as sesame (*Sesamum indicum* L.) and sunflower.

3.6.3 Agricultural Practices

Smallholder farmers relied on hand hoes, machetes, axes and sickles for cultivation. They used the slash and burn system to clear fields. Farmers mixed crops in order to diversify, increase productivity, and reduce risks due to pests and diseases (Davies, 1997). Maize was the main crop in this mixing and most of the operations were concentrated around this crop. Mix cropping was performed as relay cropping starting from November to February/March.

Weeding was the major cropping operation. Tickner *et al* (2001) also acknowledges that weeding was performed very late. Little or practically no chemical inputs were used except for cotton and tobacco crops. However, Tickner *et al* (2001) found that not all the crops were profitable if smallholders used inorganic inputs. Inclusion of leguminous crops such as cowpea and boer bean in the cropping system improved the fertility of the soil by incorporating atmospheric nitrogen into the soil. Pests and diseases were not a major concern in the fields. However, elephants, wild pigs and monkeys increasingly threaten smallholders' subsistence in those districts within or approaching Niassa Reserve in Metarica, Maua, Marrupa and Nepepe (Tickener *et al*, 2001, PAMA, 2003). Storage pests were a concern as few households used appropriate substances and techniques to suppress pest activities during storage.

3.6.4 Cultivated Crops

The chief food crops were maize, cassava, sorghum and rice as staple foods and Boer bean, cowpea and bambara nut as accompanying foods (Tickner *et al*, 2001; PAMA, 2003). Food crops were used for own-consumption while the surplus was sold. The major promoted cash crop was cotton, and newer promoted cash crops were tobacco, sesame, sunflower and paprika. Households with land near the rivers also cultivated vegetables for consumption and for sale. Further information about crop cultivated can be found in Lukanu *et al* (2004).

Current yields are low compared to the potential yield under smallholder conditions (Bias and Donovan, 2003) (Table 3-2). Low yield was attributed to the poor seed quality, low planting density, lack of inputs, lack of labour, late weeding, poor soil management and other cropping system related constraints. However, it is important to point out that smallholders did not see poor yield as a problem in their cropping activities (Tickner *et al*, 2001).

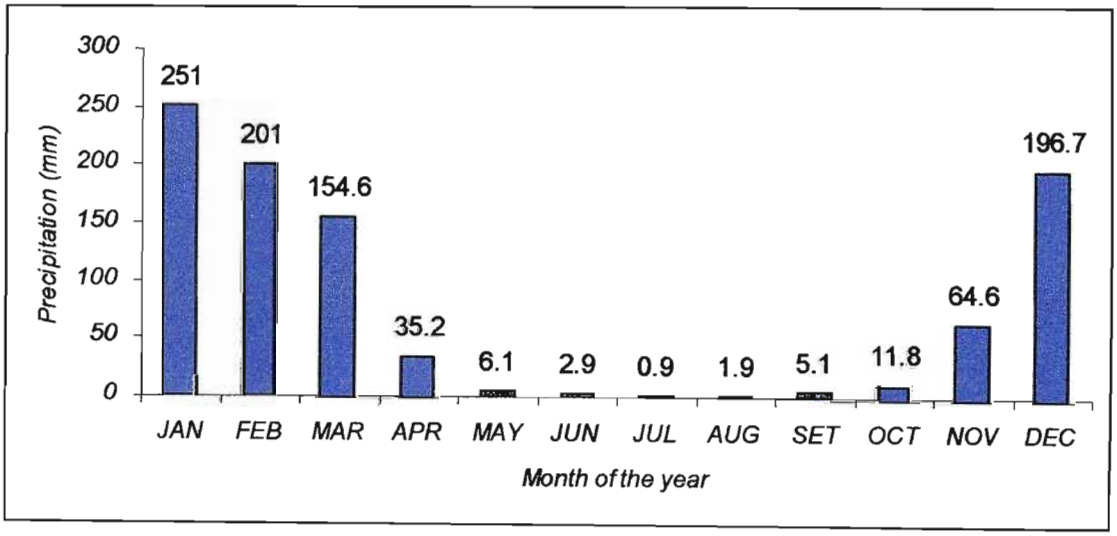

Figure 3-2. Rainfall pattern of Cuamba during the 2003/2004 season (Estação Meteorológica de Cuamba, 2004).

Table 3-2. Yield data and yield potential in southern Africa for some selected crops (Tickner et al, 2001, PAMA, 2003 and Manussa, 2003).

	Yield	
	Southern Niassa	**Expected yield**
	(tons/ha)	(tons/ha)
Maize	0.5 – 1.3	1.8
Beans	0.3 – 0.6	0.7
Tobacco	0.7 – 1.2	1.5
Cotton	0.3 – 0.7	1.5
Sesame	0.2 – 0.6	0.8
Sunflower	0.5 – 0.6	1.5
Paprika	0.4 – 0.5	2.0

3.7 Socio-political and Socio-cultural Aspects

People have two authorities that helped solve problems: traditional and government authorities. However, at the village level the village chief (muené) had more authority than government authorities do. The village chief permited entry into the village for development or business work; he solved conflicts and distributed land (Davies, 1997; PAMA, 2003).

The dominant population in southern Niassa was of ethnic Makhua. However, the neighbouring districts close to Malawi (Mecanhelas and Mandimba) also had a few ethnic Nyanja people. The traditional system was matrilineal and matri-local where the family lived together, including married daughters with their husbands and children (Davies, 1997). A husband moved to his wife's village where he was given land for cultivation to feed his family. He was also expected to work in his mother-in-law's field (Davies, 1997).

It was also important to point out that in the districts of Marrupa, Maua and Nepepe, people were semi-nomadic, living near the roads after harvesting and distant from the roads in their fields during the cropping season (PAMA, 2003). They also lived in spread out villages. Distances between these villages were large (PAMA, 2003). These factors created obstacles to agricultural market development activities such as extension, dissemination of information, collection and transportation of products because of distances that smallholders travelled.

3.8 Cash Crop Promoters

3.8.1 Investors and Donors

The importance of agricultural market development in southern Niassa could be appreciated by the number of donors in the area (Annexure 2). Financial support support also came from other donors not based in Niassa. In addition, João Ferreira dos Santos (JFS) Company, Export Marketing, V&M Company and formal traders had also invested funds in various agricultural marketing activities.

The government of Mozambique had developed and continue to develop appropriate policies and strategies on trade, taxes and incentives to stimulate agricultural markets. For example, the government reduced the import duties for fertiliser (from 20% to 2.5%) and the tax rate on profit from agricultural products. The government made a significant effort to reduce administration barriers by facilitating application to start business. It had also invested in the reconstruction of roads, railways, ports and shipping to stimulate agricultural markets (Tickner *et al*, 2001).

3.8.2 Implementers of Agricultural Development Projects

PAMA (2003) provided a detailed survey of different buyers involved in promoting and buying smallholder products in southern Niassa. PAMA (2003) identified 10 NGOs, three agribusiness companies, 66 formal and 276 informal buyers, and a number of Malawian buyers involved in agricultural markets in southern Niassa. Agribusiness companies and formal buyers relied on buying brigades and informal buyers that bought directly from smallholders. Buying brigades were temporary staff recruited by agribusiness companies and buyers during buying and collection of smallholders' products. Agribusiness companies gave money and placed the brigades in key points to buy and gather enough quantity to justify the hiring of a transport facility.

Informal buyers were not registered or they just paid taxes to the local authority. Often they lacked organisational and auto-financing capacity and they were therefore unable to qualify for loans (Tickner *et al*, 2001). Nevertheless, because they provided strong competition during buying, agribusiness companies such as Export Marketing and V&M Company preferred to provide them with funds in exchange for the products, mainly food cashcrops, sesame and sunflower (Manussa, 2003). Farmers also sold food cash crops in the local and

informal market to those buyers that sold as retailers. They also sold to other informal traders who waited in the local market.

Formal buyers were registered and paid taxes (PAMA, 2003). They could be classified as:

(i) Large formal buyers, with shops, storage, funds for auto-financing and transport facilities;

(ii) Medium and ambulant formal buyers, with a milling machine or oil press, a shop in the city district, with capacity to self-finance the buying of agricultural products and with transport facilities; and

(iii) Small and ambulant formal buyers, who are only involved in buying of outputs, with no transport facilities but have collateral to contract loans for buying and renting of transport.

JSF, Export Marketing and V&M were the largest agribusiness companies in southern Niassa. The last two companies were involved in the marketing of food cash crops and dictated farm gate prices in southern Niassa. JFS was involved in all stages of cotton and tobacco promotion (Annexure 2; Lukanu *et al*, 2004). Servir Mozambique was another company involved in most operations for sunflower promotion in a very limited area in Maua district. There were also one research and three training institutions (Faculty of Agriculture, Center Utuculo, the Basic Agrarian School in Lichinga and Agrarian Research Estation of Lichinga) worth mentioning because of their importance in the improvement of agricultural markets (Bias and Donovan, 2003).

Table 3-3. Provide information about promoters, the crops promoted and percentage of smallholders involved in each crop in 2001. During 2001 most NGOs promoted sunflower.

Table 3-3. Promoters, cash crop promoted and the percentage of farmers involved (Lukanu et al, 2004).

Crops	Cotton %	Tobacco %	Sunflowers %	Sesame %	Paprika %	Lemon grass %	Vegetable %
Respondents	52	37	35	24	3	2	3
JFS[1]	100	97					
UCASN[2]			3				
OXFAM[2]			3				
GAA[4]			26				
ACRIS[5]			9	2	67		13
DDA[6]			3				
AGRICOM[7]			3				
PRESS OWNERS[1]			9				
OWN INITIATIVE		3	43	98	33	100	87

3.9 Rural Infrastructures

Three key roads served Southern Niassa where most outputs were transported to the distribution points: two roads to Malawi and one road to Nampula. These roads also led to Central and Southern Mozambican cities. No roads were asphalted; some had bridges made of local material, were full of potholes and sometimes could hardly be used during the rainy season (PAMA, 2003). Access to interior districts was not easy even during the dry season (Manussa, 2003). Roads between fields, villages and selling points were also not good.

Few local people owned cars and transport costs were very high (US$0.14/(ton x km)) during peak periods (Manussa, 2003). However, there has been an improvement in the transportation systems and waiting time has changed from two weeks to two days between 1994 and the present moment (Bias and Donovan, 2003). Smallholders relied on bicycles or walk carrying loads on their heads. Long distances were travelled to transport products to Southern Mozambique, a food deficit region. This was economically viable only with high value crops and with the use of returning vehicles.

The railway to Nampula-Nacala Port has improved and there was a train almost every day. However, the railway from Cuamba to Malawi has received little attention (Tickner *et al*,

2001). The railway from Cuamba to Mandimba-Lichinga needed major improvement to allow at least two trips per week against the currently one trip per two weeks. The maritime route from Nacala Port to the south of Mozambique (Maputo Port) was very expensive and incurred some unpredictable delays. It was economically viable only for high value crops and with returning ships (ships that were hired from Maputo to transporte products to Nacal, often return empty).

The absence of electricity inhibited the rural establishment of processing and manufacturing industries (Manussa, 2003). Only Cuamba and Mandimba cities had reliable sources of electricity. The other city districts had generators that operated during night-time. A poor banking system also created obstacles to agricultural market development. Cuamba was the only city in southern Niassa with one banking facility (PAMA, 2003).

3.10 Communication and Market Information

An efficient market cannot operate if the marketing information system is deficient (Manussa, 2003). Market participants need information about yields, prices, costs, demands and buyers (Manussa, 2003). The Ministry of Agricultural and Rural Development together with the Michigan State University had developed an Agricultural Markets Information System (SIMA) that provided market information using internet, radio and newspapers. However, their capacity to reach smallholders was limited and they still needed improvement (Manussa, 2003). Dissemination of information to reach the smallholders could be facilitated via radio, written information, telephone, and internet and through the extension system.

The radio system also improved in the last three years with UNESCO (a United Nation Programme for Education and Culture) support for the installation of community radio stations in Cuamba and Marrupa. More than 73 percent of smallholders listened to Cuamba, Marrupa, Nampula, Malawi and/or Lichinga radios (PAMA, 2003). The Nampula Radio reached all of the southern Niassa districts. However, information was not necessarily appropriate for the region. In view of the need for local-specific information, WR-SempreVerde provided cultivation and market information using Marrupa and Cuamba radio; while Oxfam and UCASN developed their own bulletins with bi-weekly and monthly publications, respectively (PAMA, 2003).

Telephone coverage has increased from about 8.7 to 15.9 lines/1000 inhabitants between 1998 and 2001 (Instituto Nacional de Estatistica, 2001). The number of operators also increased. Apart from the fixed line, Mcell entered the market in 2003. Most development institutions had radio systems that help communication with field staff. Most promoters of cash crops were also connected to the internet. SIMA published its market information through the internet system. Some promoters (for example, Intermon) based in inner districts such as Marrupa used the radio system to connect to the internet using a bush-mail system (PAMA, 2003). However, telephones and internet are limited to institutions and traders as opposed to smallholder farmers.

3.11 Credit Provision

Lack of credit was perceived as a major constraint to development of input and output markets (Jeje *et al*, 1998; Gladwin *et al*, 2001). There were two state owned banks in the early 1990s that were heavily but unsuccessfully involved in the provision of agricultural credit: "Banco Comercial de Mozambique" (BCM) and "Banco Popular de Desenvolvimento" (BPD) (Bias and Donovan, 2003). The BPD was privatised and re-named Banco Austral, and now partly owned by ABSA Bank of South Africa. At present, there is no formal Bank providing loans to smallholders in Mozambique.

Donors, investors and government supported GAPI (Gabinete de Apoio Para of Investimento) and AMODER (Apoio Mozambicano para o Desenvolvimento Rural) as credit intermediaries. GAPI was initially established as a project in the mid-1980s and later transformed into a legally recognised financial intermediary. It provided short-term loans to firms, cooperatives and individuals at a monthly market interest rate of three percent (Bias and Donovan, 2003). Fifty percent of GAPI's loans were allocated to agricultural production, rural trade and agro-industry.

AMODER used funds from the European Union (EU), Swedish International Development Agency (SIDA) and its own to provide credit to buyers. The institution relied on documents and collateral to provide loans (Bias and Donovan, 2003). Intermon also provides agricultural credit in the district of Marrupa. World Relief-FCC and Associação para of Desenvolvimento Communitário (ADC) also provide small loans to individual traders in Cuamba, Mecanhelas, Maua and Metarica districts. However, smallholders still relied on

their own savings in cash or in the form of livestock for agricultural investments (Manussa, 2003).

3.12 Farmers' Groups and Farmers' Associations

Farmers' associations provided the organisational basis required to reduce costs for the provision of information, inputs, credit, extension, and for the collection of outputs (Tickner *et al*, 2001). After independence, the government attempted to develop agricultural cooperatives. However, farmers had bad experiences due to the top-down approach used by the government and the idea of common property that only benefited a few leaders. In 1996, UCASN (Unioão dos Camponese a Sul de Niassa) re-started developing cooperatives in southern Niassa but re-named those associations to dissociate them from the bad experience of the former cooperatives. After seven years, UCASN with NGOs and donor support has involved about 8000 farmers in 254 associations grouped in 32 unions (PAMA, 2003). During 1999-2003, CLUSA (Cooperation Ligue of USA) assisted UCASN with farmers' association development while Oxfam assisted with agricultural extension.

The impact of UCASN work in the improvement of agricultural markets has been enormous. Smallholders acknowledged that UCASN has facilitated the buying of their outputs (PAMA, 2003). UCASN marketed more than 803 tons of surpluse produces from remote areas in 2002 (PAMA, 2003). Through UCASN, credit from GAPI and AMODER reached smallholders in remote villages. This institution also provided its own funds and advances (up to seven days) from agribusiness companies to unions and associations. Smallholders also acknowledged UCASN for the re-introduction of adult education in rural areas, and facilitated with the provision of inputs, implements, extension and technical assistance.

However, UCASN faced many constraints in the development of farmers' associations (PAMA, 2003). UCASN was financially dependent on NGOs and donors as it only covered three percent of its operating costs. The expected income through members' contributions, interest from loans and commercialisation was not attained. As a consequence of this dependency, UCASN lost its own direction. In addition, divergent objectives among different supporting donors and NGOs often provided multiple directions. For example, while CLUSA enhanced cultivation of cash crops, OXFAM stressed cultivation of food

crops for direct consumption (PAMA, 2003). Most support for UCASN lasted less than three years while a minimum of five years was required to build solid farmers' associations.

In addition, UCASN field assistants have continued to perform management and accounting work for the associations because of difficulties in training the members with very low literacy level. There are also serious constraints in legalising associations due to members' lack of identification documents, low literacy level, lack of funding to cover administrative and logistic costs and bureaucracy. Poor education, lack of legalisation, lack of collateral and lack of trust impeded direct provision of loans to associations. UCASN intermediated between AMODER, Gapi and farmers' associations for loans. However, UCASN provided small loans (US$210) to associations to avoid losses in case of default (PAMA, 2003). The drop-out rate was very high because members were demoralised due to: delayed repayment of the benefit; poor viability of business operations; lack of business or attractive activities; delayed provision of or lack of funds to buy members' and smallholders' outputs; and lack of information on the business activities of association (PAMA, 2003).

More than 60 percent of the farmers' associations made losses in their trading operations (PAMA, 2003). The high cost of transportation (mainly for those farmers' associations situated more than 200 km from Cuamba), high interest rates on loans, lack of storage facilities, the seasonal nature of agribusiness and poor management capacity contributed to these losses (PAMA, 2003). There was also a lack of spirit of cooperation among members. When they made gains, there was a general tendency for members to share the profit than to capitalise the association. Some farmers' associations preferred to limit new entrants to avoid the reduction of dividends. However, when they made losses they stopped paying their financial contributions to the association (PAMA, 2003). These situations were exacerbated when dishonest leaders appropriated the associations' resources.

In Marrupa district, there were also four associations not developed by UCASN (PAMA, 2003). The largest association, developed by IBIS in 2000, involved about five villages. The public and NGO's extension services also attempted to develop groups in order to facilitate the provision of extension, inputs and livestock (PAMA, 2003).

3.13 Input Provision, Appropriate Technology and Services

Inputs and agricultural services helped smallholders intensify agricultural production (Bias and Donovan, 2003). Jeje *et al* (1998) suggested that application of inputs could increase yields by 67-576 percent. Through the 1980s, the state owned Interquímica and Boror Commercial imported and distributed the inputs through a network of retailers (Jeje *et al*, 1998). However, with the failures of Boror Commercial, Interquímica was unable to operate because of the lack of a retail network. In line with the Economic Rehabilitation Programme in 1987, the government has retreated from direct intervention in the market, leaving private operators in agribusiness (MAP/MSU Research Team, 1996).

However, private operators have failed to establish input markets (T&B Consultant and CONSIA Consultants, 2002). There was poor demand for inputs because of high input costs, low prices of outputs and poor yields (Jeje *et al*, 1998). There was also little incentive to increase yields because of failed output markets. Jeje *et al* (1998) reported that from 1991-1995, Mozambique used two kg of NPK/ha (N = Nitrogen, P = Phosphate and K = potassium) compared to 17 kg in southern Africa, nine kilograms in Sub-Sahara Africa, 54 kg in Latin America, and 80 kg in Southern Asia.

High input costs were partly a consequence of high import costs, poor roads, lack and high cost of transportation. The Japanese KR-II programme has been operating since 1986 and supplies the majority of agrochemicals used in Mozambique (Jeje *et al*, 1998). The programme was intended to support smallholders' food production but, in practice, most inputs were routed to outgrower companies for cotton production. Officially, the programme subsidised about 30 percent of the costs but in practice it subsidises more because most of counter-values went uncollected. Many authors (MAP/MSU Research Team, 1997; Jeje *et al*, 1998) had voiced concerns about the KR-II centralised ordering and distribution system, which caused uncertainty in delivery. According to those authors, the programme retarded the emergence of private input procurement and distribution systems by providing subsidised inputs. Jeje *et al* (1998) suggested that the KR-II should become mainly a financing mechanism to enable private firms to order inputs.

Poor involvement of the private sector into agribusiness was a result of lack of skilled and experienced traders to manage agrochemicals. The periodicity in which business was performed also resulted in disinterest (Tickner *et al*, 2001). Apart from not being a

profitable business for smallholders, input business was not profitable for private companies either. Therefore, its development in the short term was questionable.

3.13.1 Outgrower Schemes Involvement in Input Provision

Outgrower schemes could improve the utilisation of inputs among smallholders because they combined cash crop cultivation with extension provision, inputs, credit, technical assistance, buying and recovery of capital and interest (Bias and Donovan, 2003). Most inputs used in southern Niassa had been channeled through JFS Company. JFS Company provided cotton and tobacco seeds, fertilisers, pesticide, implements and extension on the utilisation of these inputs. Tickner *et al* (2001) suggested that outgrower schemes were in a better position to provide inputs for food crops. In fact, the government joint venture with some multinational companies in 1990 (JFS included) consisted of granting concession rights to these companies in exchange for inputs and extension service provision for both promoted cash and food crops (MAP/MSU Research Team, 1996). However, only Lonrho, a South African based company, fulfilled this part of the agreement.

3.13.2 Seed Production and Seed Supply

The National Seed Programme (PNS), set up just after the independence with FAO (United Nation Food and Agricultural Organisation) and MONAP (Mozambican Nordic Programme) support, produced seed. Between 1982 and 1986 the state owned marketing agency Agricom distributed the PNS seed to smallholder farmers (Jeje *et al*, 1998). PNS was later replaced by the state National Seed Company (ENS). In 1989, ENS was transformed into a new business venture known as Semoc with the Zimbabwean Seedco owning a 51 percent share (Bias and Donovan, 2003). The South African seed company Pannar from Greytown also entered the Mozambican seed market in 2002.

Initially SEMOC produced seed on its own farms but later opted to subcontracting NGOs and farmers' associations (Bias and Donovan, 2003). Although there was inspection and certification by National Seed Services (SNS), the quality of the seed from subcontracted farmers was often questionable. There has also a lack of foundation seed (starter or original seed) for smallholders. After the peace agreement, foundation seed came from neighbouring countries and locally. The National Institute for Agricultural Research (INIA), Eduardo Mondlane University (UEM) and Semoc have taken the lead in ensuring quality foundation and open pollinated seeds for reproduction by private companies and NGOs. Semoc and Pannar also imported seed for subsequent distribution in Mozambique.

Seed companies depended on emergency and agricultural development activities. NGOs and the government Emergency Programme for Seeds and Implements (PESU) bought and distributed seeds to the farmers. Seed supply by SEMOC increased rapidly from 2000 tons in 1988 to 14 000 tons in 1993, 9000 tons in 1994 and then fell to 5000 tons in 1995 in line with intensity of the emergency and development work. Farmers are now less likely to buy seed because of the high cost, poor supplies and high expectations that seeds should be distributed free as was the norm (Tickner *et al*, 2001). SEMOC also lacke retail outlet infrastructure because it depended on emergency and NGOS as its main clients.

The majority of smallholders (85%) were reseeding instead of buying quality seed (Jeje *et al*, 1998). They utilised their own saved seeds, received seed offers, and/or exchanged labour for seed from their families or neighbours (Tickener *et al*, 2001). Tickner *et al* (2001) suggested that the temporary introduction of improved seeds, and reproduction through NGOs and farmers' associations could help supply quality seeds to substitute the degenerated seeds from local varieties.

3.13.3 Local Technology

It is unlikely that input markets will emerge soon. Knowing this, INIA (Instituto Nacional de Investigação Agrária) and others have embarked on developing sound soil fertility and plant protection practices that could increase yields by about 35 percent while conserving the environment (Tickner *et al*, 2001). The simple practice of changing the time of sowing, weeding and harvesting, and use of correct spacing and quality seed could enhance yields (Bias and Donovan, 2003). Improved intercropping, crop rotation and combination between conventional and organic farming is also likely to increase yields. Apart from incurring low prices, these practices were healthier and required only knowledge, improved seeds and labour. World Relief introduced certified organic farming in 14 villages of Cuamba with paprika, cayenne pepper (*Capsicum annum*), hibiscus (*Hibiscus sabdariffa* L.), sesame, lemon grass and Echinacea (*Echinacea purpurea)*.

3.13.4 Traction Services, Implements and irrigation

The government invested heavily in farm machinery after independence, purchasing more than 3000 tractors and 300 combines in the late 1970s and early 1980s (Jeje *et al*, 1998). Currently, demand for traction services is low and owners often use tractors to transport construction materials such as sand. High costs and lack of financial resources could

account for this poor demand. Animal traction was not practiced and would take long to introduce (Tickner *et al*, 2001). In addition, the presence of tsetse fly in the areas impeded the development of animal traction in southern Niassa (Jeje *et al*, 1998).

Farmers often complained of lack of implements, although it was hard to find a household that did not cultivate crops because of the lack of implements (PAMA, 2003). Traders had difficulties selling implements due to poor demand. This is because farmers could use implements for about three years. On the other hand, free distribution during emergency periods had given the impression that implements would continue to be distributed free (Tickner *et al*, 2001). It was more worthwhile for traders to sell clothes, salt, bicycles, radio and other foodstuffs than to trade agricultural implements (PAMA, 2003).

No major intervention has been done to promote small-scale irrigation in Niassa. Tickner *et al* (2001) suggested that investment in farmer-controlled small-scale irrigation schemes, including dams and water deviations to fields, should be encouraged to stimulate production, mainly of high value crops such as onions, garlic and paprika in Northern Mozambique.

3.14 Extension Services

Lack of or inaccessibility of the extension systems has been reported as one obstacle to agricultural development in Africa (Gladwin *et al*, 2001). The Mozambique government agricultural extension was institutionalised in 1987. It used the Training and Visit system until 1992 when participative methods were introduced to correct the top-down approach (Bias and Donovan, 2003). A channel mix in the forms of direct contact, farmer-to-farmer contact, group contact and mass media was used. The public extension service operates in Most districts of southern Niassa. The NGOs extension services collaborated with public extension to include more smallholders. Tickner *et al* (2001) suggested that this collaboration should improve extension work.

Extension services are faced with many problems. Unlike Malawi and Zimbabwe where university graduates work as field extension workers, in Mozambique the level of education of extension staff was very low (PAMA, 2003). It was very difficult to recruit staff with training in agriculture and extension.

Dispersed households and fields in the villages and distances between villages made extension activities very demanding. In addition, extension recommendations were sometimes inapplicable because of high costs and unavailability of the recommended inputs (T&B Consultant and CONSIA Consultants, 2002; PAMA, 2003). Extension needed to address aspects related to production and marketing (T&B Consultant and CONSIA Consultants, 2002).

3.15 Buying of Agricultural Crop Products

Buying of smallholders' outputs at good prices created incentives for smallholders to follow extension recommendations, pay for inputs and subsequently increase yields (Bias and Donovan, 2003). In fact, Tickner *et al* (2001) recommended that no agricultural development programme should be contemplated before first considering its marketing component. Output marketing changed dramatically from the colonial to socialist economies when government intervention in markets was very active, to the present situation of liberalised markets (Bias and Donovan, 2003). The Instituto de Cereais de Moçambique (ICM) was involved in the buying of food cash crops and it owned a nationwide storage network. However, with the war, poor management and liberalisation, ICM gradually lost its role in the marketing of outputs (Bias and Donovan, 2003). Now ICM rents out most of its storage facilities in southern Niassa to private companies such as Export Marketing Company.

State controlled prices are almost over, except for cotton where the Cotton Institute establishes pricing guidelines; and cashew nuts where export taxes affect farm gate prices (Bias and Donovan, 2003). There was some marketing control by local government in southern Niassa concerned with excessive transfer of products to Malawi under the pretext that it would cause famine in the region.

3.15.1 Buying of Food Cash Crops

The organisation of food cash crops for marketing relies on spot markets; the producers are independent producers and sell to any buyers who appear at the right time and offer the right price (Bias and Donovan, 2003). Although spot marketing has the advantage of allowing competition between buyers, smallholders have no assurance of selling when the demand is low because there is no pre-agreed production-marketing arrangement (Tickner *et al*, 2001).

Informal or formal ambulant buyers, larger formal buyers, farmers' associations, and/or buying brigades bought food cash crops directly from smallholders. Agribusiness companies also had their stores to buy food crop products. Buying brigades made the necessary arrangements through the village chiefs while ambulant buyers stood on the roadside waiting for casual sellers (Bias and Donovan, 2003). Often, large buyers and agribusiness preferred to have marketing arrangements with ambulant buyers. Direct or intermediary buyers usually sold their products to Export Marketing Company, V&M, traders in Nampula, or traders over the border with Malawi (PAMA, 2003).

Scales and containers were used for weighing and measuring during the buying of grains. However, smallholders frequently complained of manipulation and cheating when scales were used (Tickner *et al*, 2001; PAMA, 2003). Smallholders preferred the 20-litre container (made locally) for selling their food cash crops, to the scale. However, there was also a risk of reshaping of the container when sellers dented the container in the bottom, re-cutted the top or altered the volumes (Bias and Donovan, 2003).

3.15.2 Buying of Promoted Cash Crops

Outgrower schemes had the capacity for overcoming the production and marketing coordination barriers to agricultural market development (Carrilho *et al*, 2003). JFS was the largest and well-established outgrower scheme in southern Niassa. It had concession rights for cotton and tobacco. Concession rights helped to ensure the recovery of inputs, credit, extension and buying costs. Concession rights also ensured that the company assembled the necessary outputs to keep the industry running (Bias and Donovan, 2003).

However, the concession reduced smallholders' bargaining power, limited farm gate prices and retarded input markets because of lack of competition (Bias and Donovan, 2003). Smallholders preferred a competitive situation for their outputs (MAP/MSU Research Team, 1997). However, MAP/MSU Research Team (1997) suggested that under existing conditions of failed input supplies, limited credit markets, unreliable buyers and lack of investments, concession rights were a viable solution; although the team recognised that the contract farming or outgrower schemes trend was clearly towards not providing concession rights.

3.15.3 Buying Prices and Profit

Smallholder agricultural profit has not changed much between 1997 and 2003 for the agro-ecological region number 7 (Table 3-4). Smallholder gross income in agro-ecological zone number 7 stagnated by US$130/household per annum between 1997 and 2003 in addition to the food reserve from own production. The main problem was lack of profitable cash crops and stagnation in prices as the Mozambican Meticais (MZM) devalued in relation to American Dollar (US$) (T&B Consultant and CONSIA Consultants, 2002). This small income was less likely to be invested in cropping or other livelihood activities. However, in agro-ecological zone number 10, where sugar beans and potato were produced, smallholders could earn about US$216/household per annum.

MDA/MSU Research Team (1996) found that low input cotton production had a negative effect on income and little effect on cereal reserves among Nampula smallholders. This team reported that experience showed that promoted cash cropping activities typically had a smaller positive effect on food consumption unless proper strategies were applied to intentionally stimulate food security.

Table 3-4. Summary of gross income of smallholder households over the years based on literature review.

Author and year	Crops	Agro-ecological region	Location	Income (US$/household)
Davies (1997)	Maize, beans and potato	8	Northern Niassa	216
MAP/MSU Research Team (1997)	Maize, cotton, tobacco, beans	7	Nampula	56 - 127
PAMA (2003)	Maize, cotton, tobacco, beans	7	Southern Niassa	130
WR-SempreVerde (2003)[1]	Paprika, sesame, lemon grass, birdseye chillies	7	Southern Niassa	138

[1] *Farmers' projected gross income.*

3.16 Quality Control, Processing, and Storage

Agricultural markets could succeed if smallholders were able to provide quality products and if their products were processed and packaged according to the requirements of buyers (Tickner *et al*, 2001). There was no quality standard for locally produced food cash crops (Bias and Donovan, 2003). The National Institute for Standards and Quality, started in 1993, had only developed quality standards for maize and wheat grains and flours (Bias and

Donovan, 2003). However, farmers were not knowledgeable about such standards. A proper extension service was needed to help smallholders to produce quality products, mainly when targeting export markets. Price premiums for different cotton, tobacco and paprika grades provided incentives to smallholder farmers to seek to produce quality products (Tickener *et al*, 2001).

Gany Commercial and Cimpam from Nampula cities possessed large maize milling capacities that absorbed products from southern Niassa. Some private companies and farmers' associations owned small sized milling machines with support from Oikos (a portugues NGOs) and German Agro Action at the village level. Although these machines had little impact on agricultural markets they saved on women's labour and provided opportunity for local employment.

In 1994 CARE facilitated the introduction of oil presses to stimulate sunflower market in Nampula (Tickner *et al*, 2001). German Agro Action, Cord, Intermon and Movimundo extended this initiative to southern Niassa. Neves, Servir Moçambique and Alvaro Carvalho in Niassa provinces and Irmãos Semedo Company in Nampula province owned mechanical oil presses that absorbed sunflower outputs from southern Niassa. JFS owned a cotton deseeding plant in Cuamba and also had packaging facilities for tobacco. World Relief-SempreVerde also introduced drying facilities for lemon grass.

Storage was a serious bottleneck, with losses due to pests (weevils, rats, and others) and damage (Bias and Donovan, 2003). Smallholders did not use chemicals for storage and relied on smoke and/or ashes to protect their food reserve against pests. They also preferred to sell their outputs just after harvest at cheaper prices to avoid damage during storage. However, if helped to store and sell at later stage, they could double their gross income (Jeje *et al*, 1998). UCASN and Oikos attempted to help its associations to own storage (PAMA, 2003). Oxfam provides extension and technical assistance to improve local storage systems with the aim of reducing pests on stored products.

3.17 Distribution and Export of Smallholder Outputs

3.17.1 Export Market

Malawi was the main export point for most of southern Niassa's food cash crops (Tickner *et al*, 2001). There was often a lack of surplus food due to a lack of land, drought and a

preference for tobacco cultivation over surplus food. Proximity to southern Niassa and good tasting of maize in relation to Malawian hybrids made the surplus maize from southern Niassa more attractive to Malawian (Tickner *et al*, 2001). In addition, there were no custom duties or taxes when exporting crop products to Malawi. However, the Malawian market was very unreliable due to Government, NGO and donor interventions, and competition from imports from South Africa and Zimbabwe (Tickner *et al*, 2001; Manussa, 2003). These factors caused lower farm gate prices and drops in the demand for southern Niassa smallholder outputs.

Export Marketing, V&M, Malawian and Mozambican buyers officially exported food cash crops to Malawi. However, informal buyers transported small and frequent quantities using bicycles or on foot (carrying the load on their heads). In fact, Tickner *et al* (2001) suggested that the exchange between these two countries should not be considered as export/import exchange given the proximity and means utilised. Manussa (2003) reported that in 1996 nearly 1121 tons of maize were exported informally from Mozambique to Malawi.

3.17.2 Southern Mozambique

Southern Mozambique was often deficient in food crops. It usually imported from South Africa and Swaziland when there were food surpluses in Southern Africa or from the USA and other world market providers when there were food deficits in the region (Bias and Donovan, 2003). Northern Mozambique, where southern Niassa is situated, was less likely to take advantage of southern food deficits because of poor roads, long distances and expensive shipping costs (Manussa, 2003). Only high value outputs of southern Niassa such as peanuts from Nepepe, reached Southern Mozambique.

3.17.3 Local and Northern Mozambique

The neighbouring large cities (Nampula, Lichinga, Cabo Delgado and Nacala) as well as coastal districts (Ilha de Mozambique) provided markets for southern Niassa products (PAMA, 2003). However, these markets were informal and small because of surpluses from other productive districts in Nampula and Cabo Delgado provinces. Cuamba with its larger population in the city was the only southern Niassa city that absorbed significant food cash crops within the region.

3.18 *Concluding Remarks*

This description of the area had shown that southern Niassa presented many constraints to agricultural market development encompassing: (i) dependency on rains whose frequent failure in the middle of the rainy season during January and/or February affected yield; reduced soil fertility; and increased the propensity to pest and diseases; (ii) socio-economic related constraints such as limited labour and lack of income for agricultural investment; (iii) cropping system related constraints such as lack of profitable cash crops, lack of inputs, use of inappropriate agricultural practices and poor storage technology; (iv) inefficient extension services due to lack of skilled personnel and the dispersed character of the villages in the districts and households within a village; (v) lack of transport infrastructures and means, limited communication system and rural electrification; (vi) lack of functional farmers' associations to facilitate access to extension services and markets; and (vii) lack of an efficient market for inputs, for agricultural services (soil mechanisation and irrigation), and for smallholders' outputs. All of these made it imperative that smallholder farmers be supported to improve their cultivation of cash cops and participation in agricultural markets.

CHAPTER 4 : RESEARCH METHODOLOGY

4.1 Introduction

The description of the area in Chapter 3 has provided some insight into specific factors that could affect smallholder market participation in southern Niassa. Chapter 2 has dealt generally with supporting theorethical bases of the factors influencing smallholder market participation based on a review of literature. Many factors affected smallholders' cultivation decisions and participation in agricultural markets, acting individually or in complex combinations. The chapter below shows how data on some factors affecting smallholders' participation in agricultural markets were collected and analysed to solve the research sub-problems stated in Chapter 1. The outline of this chapter includes the description of the study area where data were collected, the survey strategies and techniques, the organisation of fieldwork and data collected.

4.2 Study Area

Data for this study were collected in Cuamba district based on cluster sampling involving villages grouped along the six key routes from the City of Cuamba to different districts of southern Niassa, Nampula and Zambezia provinces. Based on the proportion of the villages, the number of villages was determined per route. Names for the villages along a route were written on small pieces of paper and placed over a table for random selection. One to two villages were randomly selected per route. The village of Nacoma was selected but not surveyed because of logistical reasons[4] while the village of Macaue in Lichinga route was incorporated to compensate for Nacoma (allowing the busy Lichinga route to have 3 villages). Figure 4-1 shows the map of Cuamba districts and the selected villages. Cuamba district is similar to other districts of southern Niassa in terms of agro-ecology, farming systems, economic, political and cultural characteristics. These districts depended on Cuamba City where the majority of the institutions that influenced agricultural markets in the region were based (Chapter 3).

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[4] *The group sent to Nacoma did not identify the village because Nacoma was an inner village (not situated on road). Resending the team on the following day would require an extra cost. The researcher took the decision to exclude the village of Nacoma in the survey. Nacoma was substituted with the village of Macaue that was close to Cuamba and the interviewer knew how to get there and perform the survey in that same day.*

The initial steps consisted of asking for authorisation from district administration for the survey to be conducted in nine villages of Cuamba. The administrator granted the authorization by providing a letter (known by credencial) that recommended all authority (government and traditional) at the village level to collaborate with the research team.

4.3 Organisation of the Fieldwork

This research benefited from World Relief-SempreVerde material, personnel and transportation facilities. World Relief workers, students from the Faculty of Agriculture at the Catholic University of Mozambique and people with at least 12 grades of schooling and fluent in the *Makhua* language were recruited to perform the survey. In total 18 people were trained to conduct the FGD and administer questionnaires. The FGD guides and questionnaires were all in Portuguese. Respondents were interviewed in Portuguese or in *Makhua* (the interviewer translated from Portuguese to *Makhua*). However, all responses were recorded in Portuguese. Annexure 3, annexure 4 and annexure 5 are the translated questionnaires from Portuguese to English.

The team piloted the FGD and the questionnaires in the village of Maluata that was not part of the study. The FGDs were performed in the afternoons. Questionnaires started early in the morning a week after the administration of FGDs. A pair of interviewers interacted with each household-head, often in the presence of other members of the households at their home or in their field.

4.4 Survey Strategy and Technique

The focus of this research was to collect data based on smallholders' information, factors influencing smallholders' participation in agricultural markets. The survey involved:

(i) An initial focus group discussion (FGD) with nine groups of leaders;

(ii) 287 usable questionnaires from nine villages;

(iii) Follow-up questionnaires about labour aspects affecting cultivation of cash crops (Annexure 5); and

(iv) Interviews with individual staff members from relevant crop promoting institutions.

The survey was conducted between September and October 2002. Table 4-2 provides a summary of the sources of data, the survey strategies and survey techniques used to collect the data of this study.

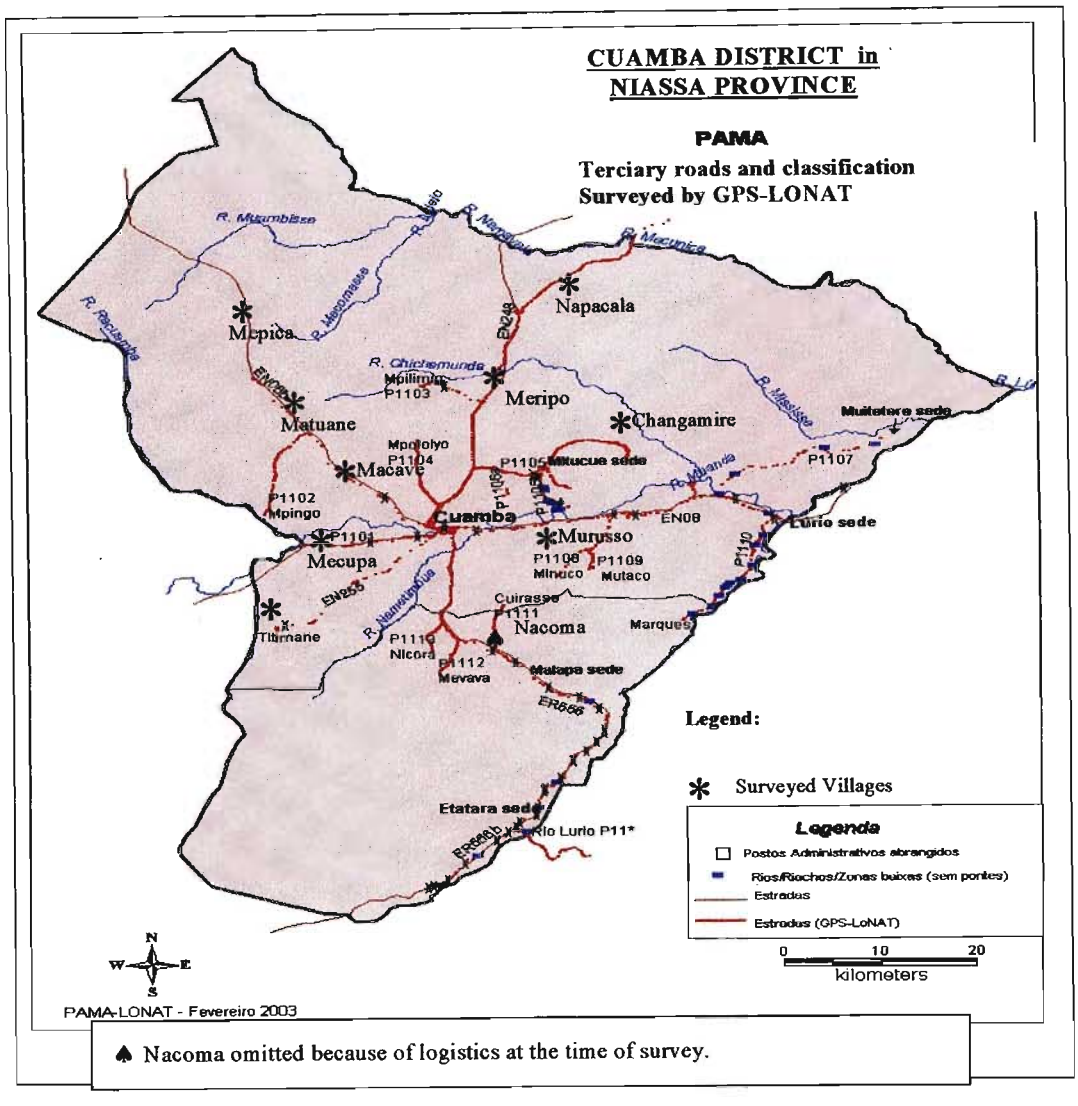

Figure 4-1. Map of Cuamba and sampled villages (Source: PAMA, 2004).

Table 4-1. Routes, villages and number of respondents interviewed (Setember 2002, Cuamba).

Routes	Villages	Number of respondents	
		Projected	Actual
Lichinga route	Mepica	32	27
	Macue	32	33
	Matuane	32	36
Metarica route	Meripo	32	35
	Napacala	32	33
Mitukue route	Changamire	32	27
Nampula route	Murusso	32	35
Zambezia route[1]	Nacoma		
Railways to Malawi route	Titimane	32	27
Mecanhelas route	Mecupa	32	34
Total		288	287

[1] *The village of Nacoma in the route to Zambezia was not included for logistic reasons.*

Table 4-2. Source of information, survey strategies and techniques used in Cuamba during to October 2005.

Data source	Survey strategy	Techniques
Village leaders	Cluster sampling based routes. Six routes of Cuamba district and one to three villages randomly selected for each route.	Focus group discussions with village leaders.
Head of households	Stratified sampling based on marital status and wealth status of the head of the household in each of the villages selected above.	Questionnaire based interviews with individual households, follow up FGD for in depth study of labour aspects affecting cultivation of cash crops.
Staff of promoting institutions	Based on relevancy according to smallholders' information related to certain institutions.	Interviews of key staff of promoting institutions.

In total four senior staff, employed by Oxfam, German Agro Action, João Ferreira dos Santos Company and Provincial Division of Extension Service were interviewed. The author has also worked in two NGOs in southern Niassa, ACRIS and World Relief-SempreVerde. The author used reports and field information from these two institutions in this study.

4.4.1 Focus Group Discussions

A focus group discussion is purposive discussion of a specific topic or related topic taking place between eight to ten individual with a similar background and common interest (Schuring *et al*, 2000). The aim of FGDs was to obtain from the bottom (local) an overview of factors influencing farmers' participation in agricultural markets. The FGD generated qualitative data that allowed an exploration of concepts, generalizations and theories about cultivation of cash crops and market participation that were grounded in the intimate knowledhe of the leaders (Schuring et al, 2000). Knowledge from the FGD also helped with fine-tuning the questionnaires that helped with the collection of some quantitative data of this study.

The author organised the study by sending letters accompanied with the "credencial" from the district Administrator to traditional chiefs of the nine villages explaining the importance of the study, asking the village chiefs for permission and requesting them to organise the group discussion on a given day and time. The focus group discussion Group was composed of the leaders from the villages (the chief of the villages and its representantive in differents areas of the villages – known by Puata-Puatas), church, mosques, political parties,

government representantive (only in the village of Titimane), teachers, nurses, and opinion leaders[5]. The similarity with these leaders was that they led or were involved with the people and were themselves smallholders, directly involved in the cultivation or indirectly through hiring of casual labour to cultivate their field. Similarity of people involved in a focus group discussion was recommended for a successful FGD (Schuring *et al*, 2000)

On average, each FGD comprised nine of leaders. According to Schuring *et al* (2000) a focus group comprising eight to ten people was enough for all the participants to have the opportunity to share insight and large enough to provide diversity of perception. A total of 18 interviewers were trained to conduct the FGDs in nine villages. Interviewers were trained to facilitate the discussion (motivate and balance participation of individual). Interviewers worked in pairs, one specifically for conducting the interview and other for note taking. The FGD involved the following steps:

A. Discussing Various Aspects of Agricultural Cultivation and Markets

Annexure 3 was used as a guideline for the discussion that covered aspects involving:

(i) The cropping objectives;

(ii) Leaders' feeling about the potential of agricultural activities in satisfying household need in food and income;

(iii) The assets smallholders bought and planned to buy using agricultural income;

(iv) The most important food crops and cash crops cultivated in the area; and

(v) The reasons why smallholders selected, rejected or continued cultivating the cash crops promoted by JFS, OXFAM/UCASN and World Relief-SempreVerde.

B. Identification of Wealth Categories and Wealth Raking Factors

Wealth ranking could be assessed by using card sorting methods or social mapping methods (Guijt, 1992). In brief, the card sorting method involved writing the names of all household-heads in a community on cards, and asking various reference groups to sort these households into piles according to their wealth status (Guijt, 1992; Simanowitz , 1998). Social mapping consisted of first drawing the map of the community, identifying the households on the map, identifying what constituted wealth, reaching agreement on the main critera, assessing household in each criteria, and then placing a symbol on the map

5 The village chiefs were asked to also contact other people they thought were capable of contributing through their experience and knowledge about factors influencing village members participation in agricultural markets.

over each household to indicate its wealth category (Guijt, 2002). Use of wealth ranking to assess the relative wealth status had its limitation because it relied on recall and assumption about wealth. Nevertheless, wealth ranking offered a snapshot of social and economic dimensions of rural life as seen through the eyes of local people themselves (Mearns *et al*, 1992).

Wealth-ranking was a subjective method and could create anomalies when compared with accepted "objective" measures of poverty, such as those used for national poverty-line statistics. According to Guijt (1992) caution was also necessary when using proxies to identify wealth, as correlation was not always positive. In addition, measures of poverty using national poverty-line statitistics also ignored the difference that may exist among households in a village when all of them are below the poverty line. For example, more than 71.25% of the people in rural Niassa were considered as poor based on poverty-line statistics (Pontara, 2000). There were differences among the poor that could be identified using wealth-ranking tools. Identification of these differences could explain the difference in participation in agricultural markets by households of different wealth status.

This study used wealth-ranking methods to identify the wealth category in the study area, and the wealth ranking characteristics, and classify households in wealth categories. The study relied on leaders' information. Leaders were asked to indicate how people were grouped in the village according to relative wealth status. Interviewers were trained about the relative wealth status to ensure that leaders compared wealth status of their members based on the villages ranking as opposed to comparing the people in the village with those in Cuamba City. Overall, three classes emerged from the discussion held in nine FGDs: wealthy, middle class and poor class.

Leaders were also asked to indicate the wealth-ranking factors they used to rank smallholders in wealth categories. Observing the number of times similar concepts were identified in the nine FGDs facilitated the development of the wealth-ranking factors and the description of each wealth category (Mearns *et al*, 1992; Ghirotti, 1992). All those characteristics mentioned four or more times were retained and used to construct the wealth-ranking characteristics in Table 6-1. According to Guijt (1992) the village' perception of poverty included a much greater range of indicators, such as access to common property resources and quality of land which were not clearly related to income level.

C. Filling of the List and Classification of Household by Wealth Status

Lists were left (after the FGD) for the leaders to fill with information about the names, wealth status, marital status and promoted cash crops being cultivated by households. Use of Puata-Puata (traditional leaders representing areas in the village) facilitated the filling of lists. On average, villages had about 320 households[6]. This participatory ranking of people in the community was however based on the subjective views of the leaders, who generated their own criteria with which to rank poverty or wealth of households (Simanowitz , 1998).

4.4.2 Questionnaires and sampling

Questionnaires can be defined as a group of written questions used to gather information from respondents (Kanjee, 2002). The sampling method and the content of the questions were prepared based on the FGD. The list obtained from FGDs of leaders was used as a sampling frame to stratify the members of the villages in different marital status categories (divorced, widows, single with children and second wives; single without children; and married) and wealth status categories (wealthy class, middle class and poor households). This consisted of first sorting the list according to marital status and thereafter classifying each marital status category according to wealth status categories (wealthy-, middle- and poor households). Figure 4-2 shows the scheme used to stratify households according to marital and wealth status. This figure provided nine strata where respondents were to be selected. In this study, stratification helped select a sample with the proper proportion of wealth and marital status to guarantee a balanced heterogeneity to the entire sample (Leedy, 1980).

6 The villages of Titimane have more 1500 households. This was a spread out village with some living 8 km away from the centre of the village (chief location). Only those households close to the village chief were considered.

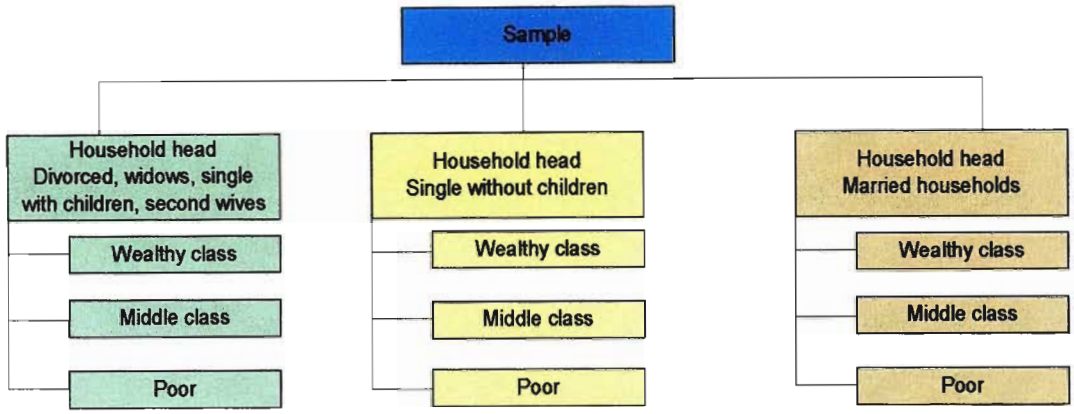

Figure 4-2. Stratified random sampling according to marital status and wealth status.

The sampling for questionnaires included 10% of the members of the villages. In total 32 members in each village were projected for interview. Members within a stratum were selected randomly taking into consideration the percentage sampling of 10%. For example, on average eight percent of the respondents were in the marital status category of divorced, widows, single with children and second wives; two percent were in the marital status category of single without children; and 90% in the marital status category of married household head (living together and sharing responsibility for the household). Each marital status category was divided proportionately in three wealth categories. For example, on average 83%, 13% and zero percent of respondents from poor, middle and wealthy classes had to be interviewed with the marital status category of divorced, widows, single with children and second wives.

A list of selected members (specific marital and wealth status) was given to the interviewers. Alternative respondents were also listed to ensure that the proportion of people of different marital status categories and wealth was maintained. If the alternative was also not available, the two interviewers were requested to identify a household head with the same characteristics (a household head with a given marital and wealth status) as the missing respondents using Visual Indicator of Poverty (VIP). The VIP allowed a fieldworker to make an educated guess about the wealth situation of a household based on visual or external criteria provided by the leader (Simanowitz, 2000; Simanowitz, 1998). In this study, these characteristics involved the housing and compound conditions (number of

houses, type of ceilling, presence of latrine, and cleaness of compound specifically, the separation between bush/field and living space); and clothing (status of the clothes, whether with holes or not). The key aspect of the VIP in this study was that locals provided the criteria.

The author was aware of the shortcomings using the Visual Indicator of Poverty to classify households according to wealth status. For example: (i) the VIP did not take into consideration changes which occurred with household welfare over time, for example the loss of a job, the main earner dying or deserting the household. Similarly household mobility could effect the VIP classification, in that a household could move to a new area and initially live in very poor quality accommodation (Simanowitz, 1998).

Interviewers also classified all the households they interviewed using the VIP test for comparison with the one provided by leaders through listing which was based on local knowledge and criteria to judge poverty. Repeated classification allowed the testing of consistency of the method. Overall there was no difference between leaders and interviewers classification.

In the case of absence, the spouses of household heads responded to the questionnaires. Respondents were also recommended to consult the members of the household for answers to questions the household heads or spouses were uncertain about. Annexure 4 shows the questionnaires used in this study. Effectively, the number of respondents varied from 27 to 36 giving a total usable sample of 287 households in nine villages. Eighteen interviewers were trained during one week to administer the questionnaires. Two villages were covered daily and a pair of interviewers worked together to administer the questionnaire. The following areas were covered:

(i) Household socio-economic characteristics (age, gender, marital status, household composition, wealth status, implement and livestock);

(ii) Cropping information (cropping objective, food and cash crops cultivated and cultivation intention for the following season)

(iii) Reasons why they cultivated, never cultivated or stopped cultivating some cash crops available in the cropping system;

(iv) Classification of cash crops in terms of labour requirement, resistance to water stress, diseases and pests, and profitability;

(v) The ideal cash crop, the support required for its cultivation and how much it should generate in income; and

(vi) Smallholders' advice to promoters of cash crops operating in their villages in relation to what should be done to improve participation in agricultural markets.

4.4.3 Follow-up Questionnaire for Labour Assessment

Additional information was obtained through a supplementary survey involving 16 randomly selected respondents to get more insight into labour aspects (Annexure 5). This follow-up questionnaire addressed the following aspects:

(i) Labour required for different agricultural operations;

(ii) Ranking of months of the year according to labour demand;

(iii) The period in which they execute a given operation;

(iv) The most boring operations and the reasons;

(v) Classification of crops according to labour demand; and

(vi) Solutions for alleviating labour demand.

4.4.4 Follow-up Survey and Interview with the Managers of promoting institutions

Interviews with the managers of four promoting institutions (OXFAM, German Agro Action, JFS and the Provincial Division of Extension Services) reflected their views about the adoption of crops they promoted, the strategies used, the adoption, rejection, discontinuity and continuity rates for the crop they promoted, and support that farmers had requested to improve their participation in agricultural markets. The managers also provided information about yield, farm gate price, inputs supplied and their respective price and the average area cultivated by smallholders for the cash crops they cultivated. Data collected from the FGDs and interviews with senior staff of promoting institutions were collated to ensure the integrity of information provided by smallholders using questionnaires.

4.5 Data Collection and Coding Used

After collection of data, the two interviewers reviewed the data for some mistakes and requested clarification from the respondents before leaving the household. Coding into an Excel spreadsheet was performed immediately after the survey by the researcher. Clarification was requested from the interviewers and if necessary, they were requested to return to the field to gain clarification from respondents.

4.6 Analytical Methods

The study employed four analytical methods to test the above-mentioned hypotheses:

(i) Descriptive statistics such as means and frequency were applied in order to identify any differences in agricultural market participation;

(ii) Correlation analyses, Z score tests and/or confidence limits were used to find whether there were significant relationships between a variety of factors and market participation;

(iii) Qualitative analysis based on information from focus group discussions was conducted; and

(iv) Simple mathematical formulae were also used to estimate and interpret crop labour requirements (CLR), available household labour (AHL), the ratio AHL/CLR, production costs and aspects of profitability.

In a statistical sense, the data represented the district of Cuamba, the headquarters of southern Niassa. However, these data could be generalised for districts of southern Niassa. These districts had the same agro-ecological conditions, the same cropping systems, the same stakeholders (donors, NGOs, traders and agribusiness companies) and the same transporters of agricultural products. The data could also reflect the neighbouring districts of Cuamba that were part of Nampula province, such as Malema district and Zambezia province, such as north of Gurue district.

However, generalisations could be hindered when taking into consideration that these districts differed in terms of distance from Cuamba city. There were also some cropping systems peculiarities in Nepepe where groundnut was the main cash crop. Generalisations could not therefore be accurate in other districts. Chapter 5 provides a description of the households' socio-economic characteristics and the reported factors and strategies influencing smallholder participation in agricultural markets.

CHAPTER 5 : DESCRIPTION OF THE SAMPLE

5.1 Introduction

In Chapter 3 factors influencing smallholder market participation in southern Niassa were described based on information from a review of empirical research and reports from NGOs and donor organisations based in Mozambique. Factors affecting market participation were diverse; they interacted with each other and market participation in a very complex manner. This chapter describes household socio-economic characteristics, cropping practices, location and access to the market and market participation for the sample. It also highlights smallholders' perceptions of factors influencing their participation in agricultural markets. Information from this chapter was used to explain the findings of this study in Chapter 6, Chapter 7 and Chapter 8.

5.2 Socio-economic Characteristics of Sample Households

This section presented data (means and percentage) of various socio-economic data in the sample. The following are the socio-economic characteristics discussed in this section:

(i) Household size and effective labour force;
(ii) Marital status of the household head;
(iii) Literacy rate of the household head;
(iv) Age of the household head;
(v) Livestock owned by the household;
(vi) Number of agricultural implements owned by the household; and
(vii) Number and ownership of bycicles and sewing machines.

More detailed information about tabulated data among various socio-economic factors can be found in Annexure 6, Annexure 7, Annexure 8 and Annexure 9.

5.2.1 Household Size and Effective Labour Force

Table 5-1 provided information about household size, dependents and working members. These data provided an indication of household labour and food consumption requirements, which were reported by smallholders to influence market participation. The average household size consisted of 4.8 members with a range between one and eighteen members per household. Of these, on average 2.3 members were actively involved in the cultivation

process while the remaining 2.5 members were dependents mostly children and elderly household members. The implication was that 2.3 members of this average household had to use their labour resources to feed themselves plus another 2.5 dependents before using the remaining resources to cultivate food cash crops or promoted cash crops.

The average household employed 0.7 external labourers to work on its farm and 0.7 of households' members were employed to work on other people's farms, giving a balance of zero. Effective labour, the sum of active household members and external labour hired by the households minus household members working as external labourers in other people's farms, was therefore 2.3 members. This suggested, if no source other than manpower was used for cultivation work, the area that a household could cultivate would be limited by what the 2.3 workers could achieve. PAMA (2003) study measured an average cultivated area of about 2.27-2.45 ha for southern Niassa. Detailed tabulated data between household composition data and other socio-economic data were presented in Annexure 6.

Table 5-1. The ratio between working and non-working members and effective labourers (n=287, Cuamba, September 2002).

	Average	STD	Maximum	Minimum
Total members	4.8	2.04	18.0	1.0
Working members	2.3	0.89	9.0	1.0
Non-working members	2.5	1.73	11.0	0.0
External labourers employed	0.7	1.87	20.0	0.0
Employed as external labourers	0.7	0.91	3.0	0.0
Non-working members/total members	**0.5**	**0.22**	**0.8**	**0.0**
Total effective labourers	**2.3**	**2.38**	**22.0**	**0.0**

5.2.2 Gender/Marital Status of Household Heads

A male member in the house gave an indication of more power because women were already busy with other work such as taking care of the children, fetching water and firewood as well as cooking (Akesson, 1994). In addition, tree cutting was very strenuous and was often assigned to men. Of the 287 households, eight percent were headed by females composed of divorced, single with children, second wife in a polygamous situation and widows. Two percent were headed by single (mostly) women while 90 percent of households were headed by males who lived married/together with their wives (Table 5-2; detailed data can be found in Annexure 7). This suggested that about 10 percent of households were likely to be short of labour necessary to cultivate enough land to produce

both for consumption and for sale because of the lack of male members that could contribute greatly towards the household labour pool. In addition, female-headed households were likely to be oriented toward cultivation of food crops, given female responsibility for household food consumption.

Table 5-2. Sampled gender/marital status (n = 287, Cuamba, September 2002).

	Total	Percentage of household heads (%)
Marital/gender status		
Divorced, widows, single with children, second wives	24	8
Single without children	5	2
Married	258	90

5.2.3 Literacy Rates of Household Heads

Table 5-3 provided the percentage of the respondents with various literacy levels for the sampled respondent households (Detailed data can be found in Annexure 7). Literacy levels could influence managerial ability as well as access and utilisation of cultivation and marketing information (Mook, 1981; Feder *et al*, 1985; Masuku *et al*, 2001). The majority of household heads (79%) had fewer than four years of schooling, 18 percent of household heads schooled between four and seven years while three percent of the household heads had more than seven years of schooling. It was expected therefore, that the majority of smallholders had low managerial ability, reduced access to cultivation and market information, high costs of acquiring information and searching for buyers, and higher degrees of uncertainty about cultivation and marketing of agricultural products.

Table 5-3. Literacy levels of sampled household heads (n=.287, Cuamba, September 2002).

	Total	Percentage of household heads (%)
Literacy level		
< 4 years of schooling	228	79
4 to 7 years of schooling	51	18
> 7 years of schooling	8	3

5.2.4 Age of Household Head

Age means experience, access to cultivation and market information, greater risk taking behaviour and accumulated resources (Polson and Spencer, 1991; Fenwick and Lyne, 1999; Masuku *et al*, 2001). The majority of household heads (58%) were at the age interval between 20 and 40 years followed by the age intervals between 41 and 60 (30%). More than eight percent of household head respondents were over 60 years old while three percent of the household head respondents were younger, less than 20 years old (Table 5-4; detailed data in Annexure 7).

Table 5-4. Sampled households' age distribution (n=287, Cuamba, September 2002).

	Total	**Percentage of household heads (%)**
< 20 years old	9	3
20-40 years old	168	58
41-60 years old	87	30
>60 years old	23	8

5.2.5 Wealth Status of Household Heads

Makhura (2001) suggested that availability of financial assets or household endowments, that were proxies for wealth status, influenced household market participation behaviour. Wealthy households had assets that, when converted into money, could be used to finance agricultural production activities such as paying casual labourers, buying inputs and implements and paying for agricultural services. Table 5-5 shows that 49 percent of respondents were poor, 36 percent were middle class households while 13 percent were wealthy households as classified by community members (detailed data can be found in Annexure 7). It was expected that wealthy households would participate more in agricultural markets than poorer households. Leaders used some of the following characteristics to classify households for wealth status: number of livestock, agricultural implements, bicycles, food reserves, the size of the fields and number of cash crops sold.

Table 5-5. Wealth status of sampled household head (n = 287, Cuamba, September 2002).

	Total	Percentage of household heads (%)
Wealth category		
Poor	148	52
Middle class	103	36
Wealthy	36	13

5.2.6 Livestock owned by households

Livestock enhanced market participation due to its effect as source of income and insurance, and it provided the possibility for income diversification in order to reduce risks. Household livestock also acted as a source of manure. Table 5-6 shows the type and quantity of livestock kept by the average household and the proportion of households raising animals (more detailed information about household livestock can be found in Annexure 8). The average number of animals per household was 4.6: goats (0.7), sheep (0.1), chickens (3.4) and ducks (0.3). If sold, the average number of animals would provide only about US$17/household. Only 57 percent of the respondents raised livestock, mostly chickens (48%) followed by goats (11%) and ducks (11%). It was expected that households with more livestock would participate better in agricultural markets.

Table 5-6. Livestock ownership of the sampled households (n = 287, Cuamba, September 2002).

	Average	STD	Maximum	Minimum	Percentage households (%)
Goat	0.7	5.6	25	0	11
Sheep	0.1	4.1	12	0	2
Chicken	3.4	7.3	50	0	48
Duck	0.3	2.2	12	0	11
Total in livestock	**4.6**	**7.4**	**53**	**0**	**57**
Total in money (US$/ household)[1]	**17**	**40**	**392**	**0**	**57**

[1] *The average market price in US$ for different livestock in Cuamba in 2002.*

Goat	*Lamb*	*Chicken*	*Duck*
12.5	*8.3*	*1.7*	*1.25*

5.2.7 Number of Implements

Table 5-7 provides information about the number of key implements that each household possessed. The average household had a total of 4.9 implements, among them hoes (2.6), machetes (0.9), axes (0.8) and sickles (0.6). It was important to observe that an average household kept more hoes (2.6) than the number of active members in the household (2.3). Implements were used for cultivation of household fields. Households also needed extra implements to provide to casual labour cultivating their field. In addition, implements were also used for non-farming activities such as construction and hunting. Further detail about number and ownership of implements was provided in Annexure 9.

Table 5-7. Implements possessed at the household level (n = 287, Cuamba, September 2002).

	Average	STD	Maximum	Minimum
Hoes	2.6	1.60	15	1
Machetes	0.9	0.59	7	0
Axes	0.8	0.75	3	0
Sickles	0.6	0.65	6	0
Total implements	**4.9**	**2.95**	**33**	**1**

5.2.8 Number and Ownership of Bicycles and Sewing Machines

Households also invested their income in bicycles and sewing machines (Table 5-8). Bicycles provided means of transport. Therefore, bycicle onwership may affect the cost of transportation, access to market information and market place, possibly because of reduced costs in searching for information and buyers. The average household possessed at least one bicycle (76%). These households were likely to participate in agricultural markets. Three percent of the respondents also invested their income in sewing machines for alternative income generation options. Additional data about number and ownership of bicycles and sewing machines was provided in Annexure 9.

Table 5-8. Bicycle and sewing machine ownership by the sampled households (n = 287, Cuamba, September 2002).

	Average	STD	Maximum	Minimum	Owning at least one (%)
Bicycles	1	0.53	3	0	76
Sewing machines	0.03	0.00	1	0	3

5.3 Location and Access to Markets

JFS, Export Marketing, V&M and other large traders had their headquarters in Cuamba City and branches in most district cities of southern Niassa. It was obvious that smallholders' direct access to city markets gave an added advantage due to higher prices when middle men were bypassed in the market chain. However, increased prices were needed to compensate for transport costs and time spent taking products to the city.

Table 5-9 provides information about distances of different surveyed villages from Cuamba City and the presence of a market in the village. The sampled villages were typically located at about 25 km from Cuamba city with Napacala (40 km) being the one situated furthest away from Cuamba City and Mecupa the nearest to Cuamba city (9 km). However, farmers were less likely to take advantage of good prices because of lack of efficient transportation systems to carry products to these cities. Apart from district cities, smallholders also marketed their products at the village level, market centres located in some villages, localities and administrative posts. There were also some village and roadside markets where food cash crops were sold. In addition, JFS Company (Cotton and Tobacco buyer) and paprika buyers established buying points in some villages where they collected produce.

JFS and paprika buyers used the same average farm gate prices for all the districts irrespective of the distance travelled. Buyers started with collecting products around Cuamba then moved to the further districts due to limitations of funds and/or staff. Distance from Cuamba only affected food crop buying during years of abundance when buyers satisfied their demand in Cuamba and then did not collect produce from surrounding districts.

Table 5-9. Distances from Cuamba and presence of a market in some villages.

Routes	Villages	Distance from Cuamba City (km)	Market Facilities in the village
Mandimba route	Mepica	30	None
	Macue	20	Permanent village market
	Matuane	25	None
Metarica route	Meripo	20	Permanent village market
	Napacala	40	Permanent village market
Mitukue route	Changamire	33	None
Nampula route	Murusso	17	Permanent village market
Railways to Malawi route	Titimane	27	Permanent village market
Mecanhelas route	Mecupa	9	None
Average distance		25	

5.4 Agricultural Market Participation

This study investigated the factors affecting smallholder market participation. Although the term agriculture encompasses crops and livestock, the study used this term to refer to crops. Further, a cash crop was defined as any crop that could be sold, whether a promoted cash crop or a food cash crop. Promoted cash crops were those promoted by a specific institution, usually under an outgrower scheme basis and/or those cultivated with the main purpose of selling to an agribusiness company. In this study, promoted cash crops included cotton, tobacco, paprika, sesame and sunflower. The last two were consumed locally but were rarely sold on local markets in significant quantities for local consumption. Food cash crops were those crops cultivated with the main intention of consumption. However, smallholders sold the surplus or an amount of food when there was some pressing need for cash.

Market participation in one part of the study (mainly in Chapter 6) was assessed in terms of the number of cash crops each household sold. It was assumed that farmers who diversified into more cash crops were likely to be classified as better market participants. This is because crop diversification served as a central strategy in managing risk. However, when comparing different crops, the percentage of households selling a given crop was used as an indication of participation for that particular crop (mainly in Chapter 7 and Chapter 8).

Table 5-10 shows that more than 74 percent of the households participated in sale of at least one crop. Thirty eight percent of respondents' households sold at least one food cash crop compared to 60 percent that sold at least one promoted cash crop. More households sold promoted cash crops than food cash crops.

Among the food crops, farmers sold more maize (28%) compared to rice (13%), sorghum (12%) and Boer beans (11%). A relatively larger yield and appealing taste made the maize crop the most important food cash crop in southern Niassa. Tobacco (40%) was the most promoted cash crop followed by cotton (23%), sesame (7%), sunflower (5%) and paprika (1%). Overall, each household sold 1.8 cash crops including food crops (1) and promoted cash crops (0.8).

Table 5-10. Respondents cultivating and participating in agricultural markets (n = 287, Cuamba, September 2002).

Crops	Percentage cultivating (%)	Percentage of those cultivating and selling (%)	Average cash crop per household
Food crops	**99**	**38**	**1.0**
Staple food crops	**99**	**32**	**0.6**
Maize	98	28	
Sorghum	67	12	
Rice	57	13	
Cassava	41	10	
Accompanying food crops	**74**	**15**	**0.3**
Boer bean	62	11	
Cowpea	47	11	
Bambara bean	20	4	
Horticultural crops	**10**	**7**	**0.1**
Vegetables	7	4	
Sugar cane	5	4	
Promoted cash crops	**63**	**60**	**0.8**
Tobacco	40	40	
Cotton	23	23	
Sesame	10	7	
Sunflower	08	5	
Paprika	1	1	
Overall		**74**	**1.8**

Table 5-11 shows that 36 percent of respondent households sold promoted cash crops only, 13 percent food crops only, 25 percent both promoted and food cash crops, and 26 percent did not participate in agricultural markets. This finding confirmed that during the 2001/2002 season smallholders preferred to sell promoted cash crops over food cash crops. The remaining 26 percent grew food crops only for own consumption.

Table 5-11. Participation in different types of crop cultivation (n = 287, Cuamba, September 2002).

Participant	Frequency of participa-tion	Percentage of all households (%)
Promoted cash crop only	103	36
Food crop only	37	13
Promoted and food cash crop	72	25
Not participating in agricultural market	75	26

5.5 Perceived Factors and Strategies Influencing Market Participation

The understanding of the reasons why farmers select the cash crops they cultivated and sold, why farmers did not cultivate some cash crops that had been promoted, and the type of support requested for households to participate in cash crop production, is of paramount importance for identifying strategies that could improve agricultural market participation. Information from farmers could complement specialist assumptions and therefore help promoters identify appropriate strategies required to stimulate smallholders' involvement in cash crop cultivation and subsequent market participation. A fundamental problem that had plagued development efforts over the past 50 years was planning projects without sufficient and accurate data on the circumstances of the target population (Agunga, 1998).

Household-heads provided their opinions about the factors that influenced their market participation by providing information on the following themes:

(i) Why did you not participate in agricultural markets?

(ii) Why did you participate in agricultural markets?

(iii) What support do you need to improve participation in agricultural markets?

(iv) What advice would you suggest to be given to promoters so that they can improve their services in this village?

(v) What solutions, within your capacity and from outsiders, were needed to solve the labour problems that affected smallholders from participating in agricultural markets?

5.5.1. Reported Factors Influencing Non-participation in agricultural markets

Farmers reported that, on average, labour demand by cash crops (33.2%) was the most important socio-economic factor that constrained smallholders from participating in agricultural markets followed by lack of experience and lack of extension support (15.4%), lack of inputs (14.1%), low profitability of crops (9.2%), lack of reliable buyers (7.1%), lack of information about prices, yield and buyers (4%) and preference for food cash crops (1%) (Table 5-12). Based on smallholders' opinion, it was concluded that an agricultural development project composed of extension support, an input package, a profitable crop, reliable buyers, provision of information about prices, yields and buyers was likely to positively influence smallholder participation in agricultural markets. Promotion of food cash crops could also be an added advantage that could influence positively smallholders' involvement in cash crop production.

5.5.2. Perceived Factors Influencing Market Participation

When asked to explain why they (smallholders) cultivated the crops they marketed, the majority of smallholders indicated that they preferred crops that helped them make money (53%) followed by cash crops that could be consumed at household levels (23%), had guaranteed buyers (22%), were profitable (9%), were easy to cultivate (3%) and crops that they had experience of cultivating and marketing (2%) (Table 5-13). Farmers responses seems to support the cash cropping pattern observed in Table 5-10 where the majority of farmers cultivated tobacco (40%), probably because it helped them make money, followed by food crops (38%) becaue they could be consumed by the member if not sold due to failed market.

5.5.3. Support to Improve Smallholder Market Participation

Smallholders indicated the need for implements (61%), inputs (53%) and credit (32%) at subsidised prices or at a very low interest rate when suggesting the support needed to improve participation in agricultural markets (Table 5-14). Overall, it was not advisable to ask smallholders what support was required as this enticed them for possible free provision of inputs or credit. Notwithstanding this list of requests, smallholders expressed their concern about the inaccessibility to inputs and credit. This opinion needs to be taken into consideration when designing strategies for improving smallholder participation in

agricultural markets. A small percentage of respondents indicated the need for tractors to increase the cultivated area (2%), and the need for reliable buyers (2%). An interview with senior staff from JFS Company confirmed that they received requests from farmers about agricultural mechanization services. However, JFS did not consider such strategy appropriate, given the technological requirements to provide such services and the financial risks involved in performing such an activity on a sustainable basis.

Smallholders also advised promoters to raise and be reliable with farm gate prices (42%), facilitate access to inputs at subsidised prices (23%), improve markets for the products (20%), improve access to credit (14%) and access to extension (10%) (Table 5-15). JFS Company had been under pressure from smallholders and the government to increase the cotton price. However, according to senior staff, the price paid to smallholders depended on world market price. NGOs were criticised for not taking responsibility and often failing with or not making the necessary arrangements for the buying of crops they promoted. According to Oxfam senior stuff, buying was not an Oxfam function. Failure to buy resulted because of a contacted private company that did not fullfil the arrangements (not buying, not buying on time, or not paying the arranged price). Smallholders also advised promoters to understand farmers' needs (5%), to introduce highly profitable cash crops (2%) and to provide tractors for land preparation and weeding (2%).

An in-depth investigation was undertaken into the strategies that smallholders were already applying and those that depended on outsiders to alleviate labour demand. Table 5.16 suggests that most actions taken by households were related to hiring casual labour in exchange for food (98%), drink (34%), money (33%), clothes (7%) and tobacco (2%). Smallholders also cooperated among members of extended families (2%). However, they expected outsiders to support them with the provision of implements (97%), provision of credit (88%), which they could use to hire casual labourers, tractor services (7%), transportation services (7%) and use of fertilisers to increase production through increased yields. Nevertheless, these expectations were less likely to be satisfied because no private (see above about JFS), NGOs or government institution wanted to provide such support because of failed attempts in the past (see chapter 3).

Table 5-12. Factors affecting non-cultivation and non-participation in agricultural markets (n = 287, Cuamba, September 2002).

	HOUSEHOLD NOT CULTIVATING (%)	NOT CULTIVA-TING DUE TO LABOUR DEMAND (%)	NOT CULTIVA-TING DUE LACK OF EXPERIENCE AND LACK OF EXTENSION (%)	NOT CULTIVA-TING DUE LACK OF INPUTS (%)	NOT CULTIVA-TING DUE NOT PROFI-TABLE (%)	NOT CULTIVA-TING DUE BUYERS MISSING, UNRELIABLE OR COME LATE (%)	NOT CULTIVA-TING DUE LACK OF INFORMATION ABOUT PRICE, YIELD OR BUYERS (%)	NOT CULTIVA-TING DUE POOR YIELD (%)	NOT CULTIVA-TING BECAUSE THEY PREFER FOOD CROPS (%)
TOBACCO	60	56	5.0	0.6	6.8	0.6	5.1	2.9	1.1
COTTON	77	41	3.0	0.9	18.2	18.5	2.8	2.8	2.8
SESAME	93	24	8.4	30.4	3.6	6.2	4.0	1.1	0.4
SUNFLOWER	95	28	11.0	26.0	5.8	9.0	2.9	0.7	0.4
PAPRIKA	99	24	50.0	12.6	1.5	1.5	5.0	0.7	0.4

Table 5-13. Factors influencing cultivation and market participation of cash crop (n = 287, Cuamba, September 2002).

	HOUSEHOLD CULTIVATING AND PARTICIPATING IN THE SALE (%)	CULTIVA-TING BECAUSE IT HELPS MAKE MONEY (%)	CULTIVA-TING BECAUSE IT IS EDIBLE (%)	CULTIVA-TING BECAUSE ONE CAN SELL (THERE IS A BUYER) (%)	CULTIVA-TING BECAUSE IT IS PROFITABLE (%)	CULTIVA-TING BECAUSE IT IS EASY TO GROW (%)	CULTIVA-TING BECAUSE THERE IS EXPERIENCE (%)
TOBACCO	40	34		24	1	5	1
COTTON	23	56		52	14	9	8
SESAME	7	60	70	0	0		
SUNFLOWER	5	65	46	8	5	3	3
PAPRIKA	1	50		25	25		

Table 5-14. Support requested by smallholders to improve participation (n = 257, Cuamba, September 2002)[1].

	Number of household heads respondents	Percentage of household heads respondents (%)
Provide credit to increase the size of the cultivated field, but with low interest rate.	158	61
Provide agricultural implements, at subsidised prices	135	53
Provide inputs like seeds, fertilisers and chemicals at subsidised prices	83	32
Fulfill the promises about buying at the right time and price, buying close to the villages to reduce transportation costs, provide bags, and do not steal from the farmers.	6	2
We need tractors for soil preparation in order to increase the cultivated area.	4	2
Facilitate access to milling machine and pre-processing support	3	1
Provide training and technical assistance	3	1
Organise and provide transport facilities	2	1

[1] *Information obtained through multiplo answer questions.*

Table 5-15. Advice by smallholders to promoters of cash crops (n = 83, Cuamba, September 2004).

Advice from the respondents	Number of household head respondents	Percentage of household head respondents (%)
Increase the price of our products, or we need good prices that will allow us to pay the production costs. Promoters should practice what they promise. This is particularly about prices. Promoters should not decrease prices during the buying process. We prefer that the boss of these institutions come here to confirm what their workers promise in this village.	35	42
Provide inputs, mainly seeds, and implements at subsidised cost. Promoters need to take into consideration that we are poor.	19	23
Improve the commercialisation process. Promoters stop us from cultivating food crops, to cultivate their crops then they do not appear here to buy. They must buy what they promote. Buyers are robbers; we do not want any more robbery. We need training in the use of scales and grading. Promoters need to take into consideration that we are poor and they should not rob us by downgrading and downscaling our products. We prefer no grading for tobacco.	17	20
We need credit to pay for casual labour; this should be provided between August and November; this is important for us to increase the area; we want individual loans not group ones; it should also be of low interest rate	12	14
Institutions should promote the crops, train and provide technical assistance to the farmers in all stages from first contact with us to commercialisation. It is unadvisable to come here just during cultivation or during buying. In addition, promoters need to motivate the farmers.	8	10
Promoters need to speak to us to learn about our needs.	4	5
Promoters should introduce profitable crops and help farmers increase the profitability of the crops.	2	2
Promoters should help the farmers to increase the area. For example, they should facilitate tractors for cultivation but at a lower price.	2	2
Promoters should create more incentive.	1	1
Promoters need to take into consideration maize production when promoting non-edible cash crops.	1	1

[1] *Information obtained through multiplo answer questions.*

Table 5-16. Suggested strategies for alleviating labour demand (Cuamba, September 2002).

Personal initiative for addressing labour demand (n = 61)	Number of respondents	Percent
Have food for work (maize, cassava and sorghum flour, fish, beans). During weeding period people prefer food to money and there is a lot of demand for food. Maize or other agricultural products can also be sold to pay casual labour directly with money or buy other products they may need.	45	98
Prepare or buy drink made of sorghum, maize or cassava for work (O' theca). Some people, mainly male will prefer drink to food or money for work.	21	34
Have money. The money that one gets from cotton, sales of other agricultural products and off-farm sources secure the payment for casual labour. One can sell firewood to get money to buy food or drink for labour. One can sell part of the rice to pay or buy products for labourers. Some farmers go to Cuamba city to look for jobs and use their wages to pay casual labour in their fields.	20	33
Exchange clothes/capulanas and other manufactured stuffs such as soap for work. One capulana[2] is equivalent to a weeded area of 30 x 40 metres square. With 10 "capulanas" we can be able to finish the weeding for a field.	4	7
Have enough tobacco for work.	1	2
Cooperation with the members of the family.	1	2
Outside support to alleviate labour demand (n = 60)		
Provide agricultural implements such as hoes, machetes, axes, sickles and hammers. These are like our engine for fieldwork, without them there is no production. With more implements we can invite more casual labour to work in our fields.	58	97
Provide credit. Money is used to pay casual labour directly or used to buy food for work. With money, we can hire casual labour when we need them. Money can also be used to buy production equipments.	53	88
Availability and access to tractor services. This is important because sometimes there are no casual labourers and we may lose production if there is a delay in hiring casual labour for weeding.	4	7
Facilitate transportation and have a bicycle in good shape.	4	7
With fertiliser we can crop small area of land but still have good harvest.	1	2

[1] *Information obtained through multiplo answer questions.*
[2] *A piece of fabric sufficient to make a woman's garment.*

The follow-up study with and information from promoters' staff (German Agro-Action, Acris, Oxfam, World Relief-SempreVerde and JFS Company) confirmed what farmers had said about poor extension coverage, complaints for additional agricultural implements, and failure to market smallholders' products that NGOs promoted. The first four organisations were NGOs promoting food crops, sesame, sunflowers and paprika. In the following chapters, the four were referred to as NGOs. JFS Company was a contract farming company promoting cotton and tobacco. In the following Chapter it was referred as JFS Company or simply JFS. Annexure 2 includes the descriptions of the agribusiness organisations and their activities undertaken.

5.6 Conclusions

Farmers perceived that factors related to labour demand, market access, extension, consumption requirements and (financially related) profitability factors influenced market participation. Smallholders did not mention agro-ecological and natural resources factors, policies and physical infrastructures as influencing their participation in the agricultural market. Farmers were not concerned about land because it was not a limiting factor in southern Niassa. Policy, institutional factors and physical infrastructures related factors were more likely to be raised if the questions were directed to marketers of inputs inputs, providers of agricultural services, providers of credit and buyers of smallholders' outputs. Smallholders also did not indicate (except labour availability) household socio-economic characteristics such as literacy level, age, gender, wealth status, income, assets and others as limiting their participation in agricultural markets. Yet researchers often assume that these factors have an influence on smallholders' involvement in the cultivation of cash crops and subsequent market participation. Chapter 6 uses the wealth-ranking tool to identify wealth status and wealth-ranking factors (or household socio-economic factors) influencing smallholder participation in agricultural markets.

CHAPTER 6 : USE OF WEALTH-RANKING TO ANALYSE FACTORS INFLUENCING SMALLHOLDER FARMERS' MARKET PARTICIPATION IN NORTHERN MOZAMBIQUE[7]

Gastão Lukanu, Maryann Green, Steve Worth & Peter Greenfield[8]

Abstract

This study aims to identify and analyse socio-economic factors influencing smallholder market participation using wealth-ranking tools. Two hypotheses were tested: both (i) wealth status and (ii) wealth-ranking factors were positively related to market participation. Significant and positive relationships were found between wealth-ranking factors (labour, number of livestock, implements, bicycles, food availability, the size of the cultivated land and crops sold) and wealth status. Wealth status and wealth-ranking factors were positively and significantly correlated with the number of cash crops sold. However, household characteristics not indicated as wealth-ranking factors such as age, gender, and literacy level related poorly to market participation. Labour was the most important wealth-ranking factor explaining market participation. The wealth-ranking tool could be used to assess the wealth-ranking factors that influenced market participation. Knowledge of these factors could helps in the identification of strategies required improve market participation. This tool could also be used to evaluate a cash crop project by checking the changes in the wealth-ranking factors and wealth status of the households after the implementation of a cash crop development project.

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[7] *Submitted for publication in Development Southern Africa.*

[8] *Respectively, Agricultural Manager, World Relief–SempreVerde, Cuamba, Mozambique; and Professor, Professor, and Senior Lecturer, School of Agricultural Science and Agribusiness, University of KwaZulu-Natal, Scottsville, South Africa.* *The cooperation of the farmers, João Ferreira dos Santos Company, German Agro Action, OXFAM and Acção Cristã Interdenominacianal da Saúde is gratefully acknowledged. We acknowledge the support from World Relief International and Swedish International Development Agency in Mozambique for letting the authors use WR-SempreVerde facilities to collect the data used in this study.*

6.1 Introduction

Mozambique is one of the ten poorest countries in the world based on the indicator of human development (Pontara, 2000). Agriculture already accounts for about 28 percent of GDP and households are heavily dependent on agriculture for income and food[9] (Arndt and Tarp, 2001). Southern Niassa has a population density of 13 people / km^2 compared to an average population density of 22 people/km^2 for Mozambique (Instituto Nacional de Estatistica, 1997). Land resources do not represent a restriction for the majority of population in the Agro-ecological zone number 7 of which southern Niassa is part (Ministério de Agricultura e Pescas , 1996). The economy of Niassa province, the poorest of Mozambique, was likely to benefit if appropriate support were provided to improve smallholder farmers' market participation. Therefore, donors and investors were willing to financially support agricultural market development activities to improve smallholder farmers' income in southern Niassa.

Understanding the factors influencing market participation was needed to design suitable strategies for agricultural market development projects. Factors affecting agricultural market participation were often identified by surveying/measuring the assumed possible or many factors influencing the situation, and then through statistical tests identifying those that were significantly related to the assessed indicators of agricultural market participation (Makhura, 2001; Matungul, 2002). The authors of this paper felt that a simple, quick and cost-effective means of identifying these factors was to ask the farmers to indicate which they felt influenced their participation in agricultural markets. This is because the relevance of factors influencing smallholder agricultural market participation change with time and space. In their study on "Farmers' cash crop cultivation decisions" Lukanu *et al* (2004) asked smallholder farmers in southern Niassa, Mozambique, to indicate the factors that influenced decisions to cultivate cash crops. Farmers identified labour, the profitability of crops, availability and reliability of buyers, availability and accessibility of inputs and implements, and access to extension services as factors influencing their participation in agricultural markets.

However, there was a general tendency for smallholders to point out exogenous household constraints to agricultural market participation such as lack of buyers, lack of extension, lack

9 The unemployment rate for formal work in the study was about 98% (Information from Cuamba District Labour Officer). Remittance money was insignificant due to lack of employment opportunities from towns around southern Niassa. Sales of local construction material, fuel, processed food, handcraft, provision of labour to others, small-scale mining of precious stones and trading activities could be observed but they absorbed very few people.

of or expensive inputs, lack of credit and low output prices than endogenous household constraints (Lukanu *et al*, 2004; Table 5-12, Table 5-14). Yet many studies have indicated that household socio-economic characteristics such as age, education, gender of the household-head, household wealth and household size influenced household participation in agricultural markets (Kebede *et al*, 1990; Makhura, 2001; Matungul, 2002).

This study proposed the use of a wealth-ranking tool as a way to assess sensitive factors or endogenous household factors that related to market participation[10]. Mearns *et al* (1992), Ghirotti (1992) and Simanowitz (2000) suggested that wealth-ranking techniques could extract sensitive socio-economic aspects of households that influenced wealth status. Key informants could provide the criteria used in their village to characterise households according to wealth status. In addition, wealth-ranking techniques also could help through simple observation, to pinpoint those households that were classified as poor, middle class or wealthy households, depending on the divisions used in each community.

The general objective of this study was to find out whether wealth-ranking tools could be utilised to analyse or identify those factors that affected smallholder participation in agricultural markets. Specifically this study had the following objectives:

(i) Analysing the relationship between wealth status and market participation; and

(ii) Analysing the relationship between specific wealth-ranking factors and market participation.

If this tool was shown to be reliable, it could form a useful adjunct for assessing valid and locally specific factors influencing smallholder participation in agricultural markets. Wealth-ranking tools may match more formal data collection and analytical tools based on assumptions by the researchers (Abalu *et al*, 1987). Use of simple, rapid and cost-effective tools could allow identification of up-to-date data used to design appropriate strategies required to improve smallholder participation in agricultural markets.

10 In this study, market participation reflected the number of promoted cash crops sold.

6.2 Analytical methods

6.2.1 Theoretical Analysis

Two hypotheses were tested, namely that both (i) wealth status and (ii) wealth-ranking factors (factors used to classify people in wealth categories) could be positively related to market participation. In his study on "Overcoming Transaction Costs Barriers to Market Participation", Makhura (2001) suggested that availability of financial assets or household endowments, that were proxies for wealth status, influenced household market participation behaviour. Even farm size that most authors have found to significantly correlate with agricultural market participation, was a proxy for wealth status (Kalinda *et al,* 2000). Factors influencing market participation were grouped according to household characteristics, economic factors, institutional factors and environmental factors (Lukanu *et al,* 2004; Figure 6-1).

These factors varied as some household characteristics, economic, institutional and environmental factors vary with the location (countries, provinces, and districts) and time (factors change with time). For example, the household characteristics such as income, wages employment, remittance income, land tenure situation, access to inputs, marketing channels and access to credit described by Matungul (2002) for Kwazulu-Natal in South Africa were different from those described for southern Niassa, Mozambique, in Chapter 3 and Chapter 5. In addition, the two places had different environmental conditions (climate, rain pattern, or soils) that may determine the type of crops likely to be cultivated and marketed. For the same place (for example, Kwazulu-Natal or Southern Niassa), things changed as a result of continued effort by government, NGOs, donors and smallholders themselves to improve the situation.

It is important to stress that the cause-effect relationship between wealth status and market participation exists in both directions. This study, however, will be limited to analysing wealth status and wealth-ranking factors as causes influencing smallholder market participation.

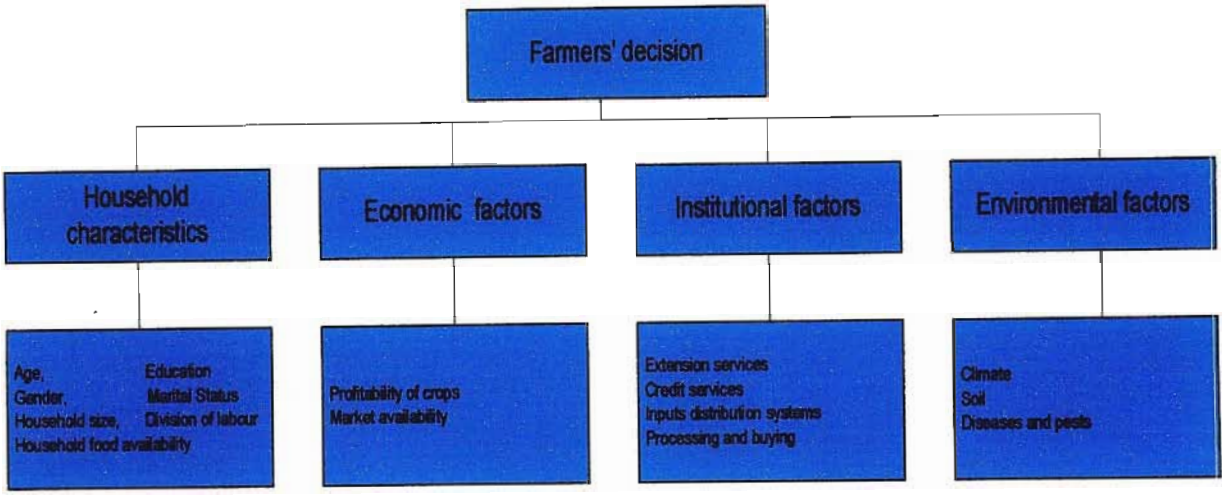

*Figure 6-1. Factors affecting farmers' decisions to cultivate of cash crops (*Lukanu *et al, 2004).*

In the remaining part of this study, the analytical methods described the techniques used to analyse the data and the methodology used for sampling and collecting the data; data collected; and the results and discussion section was presented, where wealth status and wealth-ranking factors were related to market participation. A final section presented the recommended strategies for using wealth-ranking tools to analyse factors influencing agricultural market participation and the conclusions.

6.2.2 Statistical Analysis

The relationship between wealth status, wealth-ranking factors and market participation were first analysed using qualitative information provided by key informants (Table 6-1). Descriptive statistics, correlation analyses and Z score test or confidence limit were used to find out whether there was a significant relationship between wealth status, wealth-ranking factors, and market participation; and to observe whether the proportion or mean of wealth status, wealth-ranking factors and the number of cash crops sold were statistically different between poor, middle class and wealthy households. All significance was reported at $\alpha = 0.05$ (P95%) level. The highest wealth status category (wealthy) was used as the standard for comparison because poor and middle class households would desire a wealthy household's standard of living (which was still comparatively poor). This was observed by comparing smallholder responses when asked to indicate their ideal cash crops and how much it should generate in income. The average desired amount indicated (US$ 354/Household; referred to in Chapter 8) was higher than the average of US$130/household reported income for southern Niassa reported by PAMA (2003).

Table 6-1. Leaders' criteria for differentiating households according to relative wealth status in southern Niassa[1] (nine focus group discussions, Cuamba, September 2002)[1].

Criteria	Wealthy	Middle class	Poor
Number of Labourers	**- At least two labourers apart from active household members**	**- At least a labourer apart from active household members**	**- Labourer to other household farms**
Livestock	**- Enough and diversified livestock.**	**- Livestock mostly chickens**	**- Few chickens**
Number of agricultural implements	**- More implements than active household members**	**Enough implements for the active household members**	**- Shortage of agricultural implements for the active household members**
Accumulated wealth	**- More than one radio - More than two bicycles**	**- At least one radio - At least one bicycle**	**- Trying to get one radio - Trying to get one bicycle**
Crops sold	**- More than one promoted cash crop (tobacco and/or cotton) - Rarely food crops for sale**	**- Only one promoted cash crop**	**- No promoted cash crop - Sell part of the food crop under pressing cash needs**
Food availability	**- Enough food crops - Enough food reserves**	**- Enough food crops - No food reserves**	**- Deficient in food - No food reserves**
Size of the field	**- Larger cultivated area for food and promoted cash crops**	**- Enough cultivated area for food crop and cash crops**	**- Small cultivated area often not enough for food and cash**
Access to manufactured products	Access to Most manufactured food products (salt, soap, sugar, oil, etc)	Access some of the manufactured food products	- Beg from wealthy and middle class to access manufactured food products such as salt
*Housing and compound	- More than one good house (with good ceiling, door and external latrines). - Clean compound	- One good house (with good ceiling, door and external latrines). - Clean compound	- No proper housing, small, with poor ceiling and no latrine. - Dirty compound
Sleeping conditions	- Good sleeping conditions (using bed, mattress and bed sheets)	- Good sleeping conditions (using bed, mattress, bed sheets)	- Poor sleeping conditions, using floor mat
*Household clothing	- household members change clothes and wife has jewels.	- Household members well-dressed only when going to city or for important events	- Poor clothing, sometimes with part of the body uncovered
Children's schooling	- Able to put the children in city schools	- Children able to study only at the village level	- Children rarely frequent the school at all
Access to hospital	- Able to pay for the household's health costs	- May pay for the household' health costs	- Unable to pay for the household' health costs

[1] *The Criteria in bold were those investigated in the following section, reflecting the most researched household characteristics influencing smallholders' participation in agricultural markets (See Chapter 3, Makhura, 2001; Matunggul, 2002).*

* *Factors used as Visual Indicator of Poverty to identify household according to wealth Status.*

6.3 Methodology

Full description of methodology used for the overall study was described in Chapter 4. Data for this chapter were collected in Cuamba district based on cluster sampling involving villages grouped along the key routes from the City of Cuamba. One to two villages were selected on each route. This chapter used data collected in the survey conducted in September 2002 that involved:

(i) An initial focus group discussion (FGD) with nine groups of leaders: The interviewers facilitated leaders to identify wealth ranking categories used in the village and the criteria used to rank households in these categories. An average of nine leaders attended in each FGD. The FGDs culminated with classifying households into wealth categories by the leaders. This was listed and later used to select individuals to interview when administering the questionnaires.

(ii) A total of 287 usable questionnaires from nine villages: Stratified sampling taking into consideration the marital and wealth status was used. Stratas were determined based on the proportion of categories of wealth status and marital status in the village. This resulted in ten percent sampling in villages of an average size of 320 households. A total of 18 interviewers, working in pair, administered the questionnaires to household head respondents. Interviewers were given a list with the names of the people to interview. The questionnaire covered household socio-economic characteristics, cropping and market participation information.

The following household data were used in this study: the number of external labourers ("ganho-ganho")[11], number of agriculturally active household members, number of members providing services to other's household fields, number of livestock owned, number of implements, number of bicycles, wealth status rank[12], number of promoted[13] and food[14] cash crops sold in that current year, farming orientation whether for cash or for consumption; age, gender/marital status, and literacy level.

The focus of this study was to observe how a wealth-ranking tool could be used to identify and analyse those factors that influenced agricultural market participation. This did not mean

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[11] *"Ganho-ganho" was the term used to refer to people employed by the household to provide agricultural work in exchange for money, food, drink, cigarettes or clothes. It was casual labour.*

[12] *Poor, middle class and wealthy*

[13] *Promoted cash crops were those crops such as tobacco, cotton, sesame, sunflower and paprika that were promoted by specific institutions for income generation purposes only.*

[14] *Food cash crops included mainly maize, cassava, sorghum, Boer bean, and cowpea and other vegetables.*

that factors such as those related to market infrastructures and others were not important. In addition, the cause-effect relationship between wealth status and market participation may have existed in both directions. Banlina and Tung's (1992) study in the Philippines found that household' involvement in agricultural production activity (and therefore participation in agricultural markets) determined their wealth status. This study, however, will be limited to analysing wealth status and wealth-ranking factors' influence on smallholder's agricultural market participation.

The study also used housing conditions as a Visual Indicator of Poverty to identify smallholders' wealth status. However, the study may fail to accurately identify the households' wealth status because of: (i) unwillingness of the household-head to invest the income in order to improve housing conditions; and (ii) a household may be living in a good looking house while it actually lives in poverty. Nevertheless, the study considered that visual indicators were the simplest method to identify households' wealth status.

6.4 Results and Discussions

6.4.1 Wealth-ranking Factors and Wealth Status

Table 6-1 shows 13 wealth-ranking factors and their variations across different wealth categories. The first seven factors, related to agricultural market participation, were analysed in this study. The interviewers used some of the remaining wealth-ranking factors like housing and clothing conditions to select households according to wealth categories. An attempt was made to confirm the relationship between wealth-ranking factors, household characteristics not indicated as wealth-ranking factors and wealth status (Table 6-2) (Cross tabulated data among various socio-economic data have been provided in Annnexure 7, Annexure 8 and Annexure 9). The expectation was that these factors should have correlated positively with smallholder agricultural market participation if they correlated positively with wealth status.

Table 6-2. The relationship between some wealth-ranking factors, household characteristics and wealth status (n = 287, Cuamba, September 2002).

Criteria	Mean or proportion				R (Critical R = 0.115)	z score test or confidence interval at α = 0.05 (critical z = |1.96|)[1]	
	Average/ Overall	Wealthy	Middle class	Poor		Poor vs wealthy	Middle class vs wealthy
Food vs cash gaol:							
For food purposes (%)	93	83	94	96	N/A	-0.251;0.002	-0.239;0.021
For cash purposes (%)	6	14	6	4	N/A	-0.013;0.221	-0.040;0.203
Livestock (number)	4.60	12.00	5.00	2.6	0.431	7.10	5.14
Number of effective Labourers	2.30	3.89	2.54	1.77	0.283	4.77	2.93
Number of implements	4.90	7.17	5.09	4.2	0.331	4.35	3.62
Number of bicycles	1.00	1.60	1.10	0.7	0.285	9.97	4.48
Age (%)							
< 20)	3	3	3	4		-0.069;0.054	-0.064; 0.062
20 – 40	59	42	67	57		-0.333;0.026	-0.441; -0.072
40 – 60	30	44	24	32		-0.051; 0.306	0.022; 0.386
>60	8	11	6	8		-0.085; 0.139	-0.059; 0.166
Literacy level (%)							
< 4	79	76	85	76		-0.135; 0.169	-0.221; 0.084
4- 7	18	19	14	20		-0.154; 0.135	-0.096; 0.196
>7	3	4	1	3		-0.077; 0.048	-0.039; 0.075
Marital status (%)							
Divorced, single with children, seeond wife	8	0	3	15		-0.205; -0.091	-0.061; 0.003
Single wthout ehildren	2	0	1	3		-0.055; -0.002	-0.028; 0.009
Married	90	100	86	82		0.115; 0.237	0.001; 0.076

[1] *Confidence interval shows the possibility that in 100 sample of interval, 95 will contain the pontual estimator (u = 0). There was no significant difference when the interbal contain zero (0). Z scores suggested significant differences when the absolute value of z score was above 1.96.*

The correlation coefficient (0.283) between effective household labour[15] and wealth status was positive and significant (Table 6-2) in concordance with key informants' suggestions (Table 6-1). Wealthy households' effective labour was significantly higher compared to that of the poor (z score = 4.77) and middle class (z score = 2.93) households. The number of labourers was also found to be a criterion for identifying households in different wealth categories in Gambia (Mearns *et al*, 1992). Sarch (1992) also expressed that the availability of labour determined well being. Annexure 6 provides information about effective household labour for various socio-economic characteristics (age, marital status, literacy rate and wealth status).

[15] *The effective household labour was estimated as the sum between active members and "ganho-ganho" minus the number of household members working in other people's fields.*

Wealthy households significantly employed more casual labour (1.69 compared to 0.32 by poor and 0.96 by middle class) and significantly fewer of its members were employed to work on other households' farms (0.31 compared to 0.79 for poor and 0.66 for middle class). By working on other people's farms, poor households reduced their own available household labour. As a result these households became more dependent on casual labour because of their inability to feed themselves from their own fields, and increased pressure to work on other people's farms for quick pay. These poor farmers often ended up entering the cycle of poverty in which each action for survival potentially led them to further impoverishment. It was then be hypothesised that the number of effective labourers would be related to market participation because it related significantly to wealth status.

Table 6-2 shows that livestock (mostly chicken farming) was positively and significantly (R = 0.431) related to wealth status and there was significant difference ($\alpha = 0.05$) between poor ($z = 7.10$) and middle class ($z = 5.14$) when compared to wealthy households in confirmation of the FGDs in Table 6-1. Based on observation, farmers used livestock more for income generation than for consumption. For example, villagers supplied the city of Cuamba with locally produced chickens. It was then hypothesised that livestock, a factor that related positively to wealth status, would also positively be related to market participation.

The correlation coefficient between the number of implements owned and wealth status was positive and significant (0.331). Therefore, wealthy households had significantly more implements compared to poor and middle class households. These findings support the FGD information that the number of implements was related to wealth status (Table 6-1). It was expected that the number of implements would also be positively related to smallholder market participation.

Table 5-8 in Chapter 5 suggested that 76% of the households had at least one bicycle. Wealthy households' number of bicycles was significantly higher in relation to that of the poor and middle class (z score = 4.48) households. The proportion of wealthy (94%) households owning a bicycle was significantly higher than that of the poor (61%, $z = -3.87$). One would have expected that the number of bicycles would be positively related to market participation because bicycles correlated significantly (R = 0.285) to wealth status in conformity to the leaders' information in Table 6-1.

Key informants reported that wealthy households had enough food for consumption compared to poor households. Ideally, the study should have assessed the amount of food that the households possessed. However, food availability was not assessed because the study relied on other agricultural factors that were examined. Table 6-2 shows that the majority (93%) of households had as main cultivation goal the production of food compared to six percent that had income generation as the main goal. Sarch (1992) wealth ranking research in Gambia found that the main determinant of well-being was the availability of food. Food availability dictated the status of the households, the partitioning of resources for food or cash crop cultivation, and subsequently market participation. As Sarch (1992) expressed it, wealthy households had year round food security while the poorest were constantly begging for food.

The relationship between the size of the cultivated land and wealth status was not discussed based on statistical analysis because of lack of assessed field size of the households. However, the study assumed and supported key informant suggestions that the size of the cultivated area was positively related to wealth status. The size of the land should have been dependent on the number of effective labourers. It would probably also influence the number of cultivated cash crops and resultant food availability. Therefore, it was hypothesised that the size of the cultivated land would be positively to related agricultural market participation.

The age and literacy level were not significantly related to wealth status based on various confidence intervals presented in Table 6-2. Based on the converse hypothesis, age and literacy level would have been poorly related to smallholder market participation because these characteristics were not indicated as wealth-ranking factors. However, poor households of different marital status were significantly different from wealthy households (Table 6-2). Data in Table 6-2 revealed that there were no wealthy households among female-headed households while all wealthy households were headed by married men. Further, the analysis showed that married and male-headed households had higher numbers of effective labourers (2.4) compared to female-headed households (1.4) (Annexure 6). The number of effective labourers in female-headed households (1.4) was fewer than that of the poor households (1.8) (Annexure 6). That is, female-headed households could be classified as the poorest of the poor in southern Niassa, and therefore less likely to participate in agricultural markets. Mukherjee (1992) arrived at similar conclusions in a study performed in India. Carrilho *et al* (2003) also reported that female-headed households were found in the low-income group in

Mozambique. Based on data investigated in this study, it was concluded that gender/marital status was related to wealth status through household labour.

6.4.2 Wealth Status and Market Participation

The income from the sale of cash crops was the best indicator of the degree of agricultural market participation (Makhura *et al*, 1997). However, it was assumed that farmers who diversified more into cash crops were likely to be classified as good participants in agricultural markets. This is because crop diversification served as a central strategy in managing agricultural production risks (Lukanu *et al*, 2004). Therefore, the number of promoted cash crops sold was used here as a good indicator of level of market participation. Food cash crops were excluded because even food deficit households or poor households (see Table 6-1, row on crop sold) also sold to respond to some pressing needs requiring money but to the detriment of their food reserves. Similar situations were also reported in Uganda where deficit producers still sold part of their food reserve to obtain money (Ejupu *et al*, 1999).

The r-value of 0.266 suggests a significant and positive correlation between wealth status and cash crops sold. The average number of cash crops sold by wealthy farmers was significantly higher than for poor households (z = 3.88) (Table 6-3). Based on this analysis and the information from key informants (see Table 6-1, row related to "crop sold"), it was concluded that wealth status was positively related to market participation. Makhura (2001) also expressed that households with more resources would be in a much stronger position to participate in agricultural markets.

Table 6-3. Analysis of significance and correlation between wealth status and number of cash crops sold (n = 287, Cuamba, 2002).

	Wealth status	**Number of cash crops sold**
Mean	*Population (u)*	*0.75*
	Poor	0.56
	Middle class	0.88
	Wealthy	1.11
Standard deviation (σ)		0.76
Z score	Wealthy vs poor	3.88
	Wealthy vs middle class	1.55
Critical z ($\alpha = 0.05$) [1]		|1.96|
Correlation Coefficient		0.266
r critical		0.115

Z scores suggested significant differences when the absolute value of z score was above 1.96.

Overall 74 percent of the sample sold at least one cash crop (Table 6-4). This proportion was relatively larger than that (29%) presented by Heltberg and Tarp (2002) for Mozambique. The difference between the data sets could be attributed to time lag, different economic and climatic factors represented in the two research projects. In this study, the percentage of wealthy farmers (83%) participating in the agricultural market was significantly higher (z score –2.21) than that of the poor (64%). On average, each respondent cultivated 4.8 crops; both for food for household consumption and for cash crops. Poor households cultivated 4.5 crops compared to 4.9 for middle class and wealthy households. Thirty eight percent of respondents sold at least one food cash crop compared to 60 percent that sold at least one promoted cash crop. Households showed an inclination toward the greater sale of promoted cash crops contrary to what was observed in the previous year when 63 percent of the respondents sold food cash crops compared to 37 percent who sold promoted cash crops (Lukanu *et al*, 2004). High profitability of tobacco and support by João Ferreira dos Santos Company (JFS) influenced households to shift from selling food crops in the 2000/2001 season to the selling of tobacco in 2001/2002 (Table 6-4).

A considerable percentage of respondents (36%) marketed promoted cash crops only (Table 6-5) compared to those that marketed food cash crops only (13%), both promoted and food cash crops (25%), and no crop (26%). Poor farmers participated more (17%) in the sale of food crops only in comparison to middle class (11%) and wealthy (8%) farmers. A considerable proportion of the poor (37%, z score 2.28) did not market any crop compared to wealthy farmers (17%).

Table 6-4. Proportion of respondents in different wealth categories cultivating food crops or promoted cash crops (n = 287, Cuamba, September 2002).

Crops	Proportion for food goal (n=287)	Proportion for cash goal (n= 287)	Proportion of households of wealthy status participating in agricultural markets			z score or confidence interval[1]	
			Poor	Middle class	Wealthy	Poor vs wealthy	Middle class vs wealthy
Non-promoted food crops	**0.99**	**0.38**	**0.30**	**0.45**	**0.47**	**-1.92**	**-0.21**
Staple food grown	**0.99**	**0.32**	**0.25**	**0.41**	**0.33**	**-1.06**	**0.85**
Maize	0.98	0.28	0.21	0.38	0.28	-0.85	1.05
Sorghum	0.67	0.12	0.06	0.15	0.22	-2.90	0.94
Rice	0.57	0.13	0.08	0.14	0.25	-2.75	1.45
Cassava	0.41	0.10	0.06	0.13	0.19	-2.66	-1.03
Accompanying food crops	**0.74**	**0.15**	**0.08**	**0.22**	**025**	**-2.75**	**0.36**
Boer bean	0.62	0.11	0.08	0.13	0.22	-2.51	-1.24
Cowpea	0.47	0.11	0.05	0.19	0.14	-1.91	0.72
Bambara nut	0.20	0.04	0.01	0.08	0.08	(-.015;0.168)	(-0.097;0.110)
Horticultural crops	**0.10**	**0.07**	**0.08**	**0.12**	**0.17**	**(-0.043;0.219)**	**(-0.085;0.188)**
Vegetables	0.07	0.04	0.02	0.06	0.08	(-0.031;0.156)	(-0.075;0.126)
Sugar cane	0.05	0.04	0.04	0.04	0.06	(-0.060;0,101)	(-0.066;0.101)
Promoted cash crops	**0.63**	**0.60**	**0.46**	**0.72**	**0.75**	**-3.06**	**-0.34**
Tobacco	0.40	0.40	0.33	0.46	0.50	-1.88	-0.40
Cotton	0.23	0.23	0.14	0.29	0.39	-3.38	-1.12
Sesame	0.10	0.07	0.06	0.08	0.08	-0.60	-0.12
Sunflower	0.08	0.05	0.02	0.05	0.14	-3.05	-1.82
Paprika	0.01	0.01	0.02	0.01	**0.00**	0.88	0.59
Overall		**0.74**	**0.64**	**0.83**	**0.83**	**-2.21**	**-0.09**

[1] *The differences were considered significant when the confidence interval did not contain zero or when the z score was above 1.96.*

6.4.3 Wealth-ranking Factors and Market Participation

Four wealth-ranking factors (number of labourers, number of livestock, number of implements and number of bicycles) were statistically related to the number of cash crops sold. The relationship between the size of the cultivated land and market participation was also analysed qualitatively based on information from key informants (Table 6-1). For example, a wealthy household related to people who had a larger cultivated area for food crops and promoted cash crops and sold more than one promoted cash crop. Therefore, based on FGDs (Table 6-1), the wealthier was the household, the larger the cultivated field size, the larger the number of crops sold, and subsequently the greater participation in agricultural markets. The relationships between household characteristics such as age, gender/marital status, literacy level and market participation were also analysed. It was assumed that these

household characteristics would have a weak relationship with market participation because they were not indicated as wealth-ranking factors.

Table 6-5. Households of different wealth categories participating in the sale of only promoted or food, both promoted and food cash crops, and not participating in markets (n = 287, Cuamba, September 2002).

	Wealthy status	Promoted crop only	Food crop only	Promoted and food crop	No crop
	Population (p)	0.36	0.13	0.25	0.26
	Poor	0.34	0.17	0.13	0.37
	Middle class	0.38	0.11	0.35	0.17
	Wealthy	0.36	0.08	0.39	0.17
SD (σ)		0.34	0.48	0.43	0.44
z score	Wealthy vs poor	-0.26	1.28	-3.52	2.28
	Wealthy vs middle class	0.15	0.39	-0.46	0.09
Critical z (α = 0.05)		|1.96|	|1.96|	|1.96|	|1.96|

[1] *The differences were considered significant when the z score was above 1.96.*

A. Number of Labourers, Agricultural Implements and Market Participation

There were significant correlations between the number of effective labourers (R = 0.175), number of implements (R = 0.525), and cash crops sold. It was assumed that a positive relationship would have been obtained if the size of the field was correlated with the number of cash crops sold, given its relationship to the number of effective labourers as found by Makhura (2001). Promoters need to bear in mind that labour was a major constraint to cash crop cultivation, mainly by poor households. Therefore, to involve poor households in agricultural market development activities, promoters needed to look for solutions that could improve labour factors in favour of the poor. By increasing labour capacity or promoting less labour-intensive cash crops, poor households could become involved in the cultivation of cash crops and subsequently become greater participants in agricultural markets.

B. Livestock Ownership and Market Participation

The money from livestock values were significantly and positively (R = 0.250) related to the number of cash crops sold in confirmation of the second hypothesis of this study. Funds from livestock were used for urgent household needs. On average, all livestock from a wealthy farmer would be valued at about US$68/household compared to US$18/household for middle class and US$4/household for the poor. This money from wealthy households' livestock could be used to pay casual labourers to cultivate an area of 0.51ha of tobacco (US$133 was used to pay casual labour to cultivate one ha of tobacco) compared to 0.14ha for middle class and 0.03ha for poor households. This equivalent money from wealthy households' livestock could be used to buy 326 kg of maize grain compared to 86 kg and 19 kg for middle class and

poor households, respectively[16]. These data give an indication of how secure a wealthy household was in terms of money value tied up in livestock. This security gave wealthy households more flexibility to participate in agricultural markets than the poor ones.

C. Bicycle Ownership and Market Participation

Heltberg and Tarp (2002) indicated a relationship between cash crop sales and bicycle ownership in Mozambique, and that the causality ran in both directions. Bicycles facilitated the transportation of crop products from the field into villages, to the buyers. They also facilitated the transportation of local merchandise such as construction material, firewood and charcoal from the village to the city; and of manufactured products from the city to the village. Combination of farm and non-farm income-earning activities had long been an adaptive strategy that allowed farmers to reduce risks (Gladwin *et al*, 2001). Households with reduced risk were more likely to participate in agricultural markets. However, in this study the number of bicycles was not significantly related (R = -0.031) to the number of cash crops sold.

Nevertheless, the relationship improved (Pearson R = 0.124), but was still not significant at $\alpha = 0.05$, when cash crop data were related to bicycle ownership. Fifty four percent of the respondents that did not have a bicycle did not sell promoted cash crops. However, there were also 35 percent of smallholders who had at least one bicycle who did not sell. It was possible that bicycle ownership was not a determining factor if buying points were close to the village. The buying brigades from large agribusiness companies and informal buyers bought at buying points close to or within the villages (7 km maximum distance).

D. Age, Gender/Marital Status, Literacy Level and Market Participation

The r-values of 0.045 and 0.108 respectively suggested a non-significant relationship between age, gender/marital status and number of cash crops sold. This was in line with the converse hypothesis that factors not used for wealth-ranking were less likely to be related to market participation where agriculture was the main economic activity. Makhura (2001) also found that there were no gender differences affecting the marketing level of some agricultural commodities in Northern Province of South Africa.

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[16] *The price of 0.21 US$/kg of maize was used.*

However, r-values of -0.152 between literacy level and cash crop sold suggested that the relationship was significant ($\alpha = 0.05$) and negative. Households with educated household-heads did not sell more cash crops than those headed by the uneducated. Makhura (2001) also found that literacy levels related negatively (but not significantly) with maize sales. Table 6-6 shows that educated people were predominantly younger, unmarried and poor. Labour requirements for younger farmers were high because they needed to open virgin land to start their field activities compared to older farmers who had cleared most of their fields (Davies, 1997). At the same time younger, single and households headed by poor may have limited financial resources to pay external labourers thus negatively affecting their participation in agricultural markets.

In addition, the educated had low livestock ownership. Lack of livestock was negatively related to market participation. Further, educated people may have perceived agriculture as an activity for the uneducated. For example, 88 percent of the educated did not market any promoted cash crop compared to 36 percent of the less educated. Twelve percent of highly educated households did not cultivate one food crop compared to less educated households who cultivated at least one food crop. Perhaps highly educated smallholders waited in vain for "good" jobs outside agriculture because of limited job opportunities. They therefore, waited with the expectation of finding better opportunities instead of cultivating to produce crop for consumption or for sale.

E. Most Important Factors Explaining Market Participation

A stepwise regression was used to analyse the factors that best explained smallholder market participation. The number of effective labourers explained 20 percent of the variation of number of cash crops sold while the number of livestock, number of implements and ownership of bicycles all together explained 35 percent of the variation. Overall, the number of effective labourers was the most important factor if one took into consideration isolated factors. However, the combined effect of the number of implements, number of livestock and bicycle ownership strongly contributed in the variation of the number of cash crops sold.

Table 6-6. The relationship of household characteristics and agricultural factors to literacy levels (n = 287, Cuamba, September 2002).

Household characteristics	< 4 years of schooling	4 – 7 years of schooling	> 7 years of schooling
Age (%)			
<20	67	22	11
20-40	72	24	4
40-60	91	8	1
>60	100	0	0
Wealth, gender and Marital status (%)			
Poor households	47	55	75
Divorced, single with children, second wife	79	21	0
Single without children	60	20	20
Married	80	18	3
Agricultural factors			
Number of livestock	4.9	3.4	2.6
Average promoted number of cash crops	0.8	0.6	0.1
No promoted cash crop sold (%)	36	53	88
Not cropping a single food crop (%)	0	0	12

6.5 Model and Strategies for Cash Crop Development

This study confirmed that wealth-ranking factors would likely to be related to market participation where agriculture was the main economic activity. Therefore, agricultural crop promoters could use wealth-ranking tool to quickly assess factors related to smallholders' market participation. Based on these factors, promoters could design strategies to benefit farmers in their participation in agricultural markets. For example, farmers may respond to the following strategies:

(i) Provision of agricultural inputs and services, on credit basis, to allow smallholders to increase crop profitability with limited labour.

(ii) Promotion of less labour-demanding crops so that poor households could use their limited effective labour for cultivation of food and cash crops.

(iii) In order to lower labour requirements during the rainy season, promoters could help farmers shift the cultivation of cash crops from rainy to dry season using lowland or small-scale irrigation schemes.

(iv) Introduction of livestock may increase the income and food availability of smallholders. Livestock income may be used to buy inputs, pay for labour and buy food. In addition, livestock could provide manure for improved soil fertility

that, if applied, could increase yield, profitability and subsequently market participation.

(v) Wealth-ranking tools may also be used to evaluate a cash crop project by observing whether:

a. Wealth-ranking factors had changed after the implementation of the project. For example, use of more external labourers or increase in the number of livestock than before the start of the project.

b. Farmers had moved from one social status category to another after the implementation of the project.

6.6 Conclusions

In places where agriculture was the main production activity, wealth could generally be improved by participating in agricultural markets. Applying designed strategies based on appropriately identified factors that influence market participation could stimulate agricultural market participation. Use of wealth-ranking tools provided wealth-ranking factors that predicted market participation. Although not analysed in this study (because this was not the aim), it was likely that market participation also influenced wealth status and wealth-ranking factors. That is, wealth status was likely to have a positive influence on smallholder farmers' agricultural market participation and vice versa. Wealth-ranking tools also provided a quick, simple and cost effective means of identifying the factors that could be used to design strategies in order to improve smallholder farmers' participation in agricultural markets.

For example, bearing in mind that the number of effective labourers was the most important wealth-ranking factor, one could improve agricultural market participation by: (i) helping smallholder farmers access credit in order to increase the number of labourers; (ii) helping smallholder farmers to use the right technology in order to increase the productivity of labour; or (iii) helping smallholders to use their household available labour efficiently through the year, that is during the rainy and dry seasons with the use of of small-scale irrigation technology.

Obviously, wealth-ranking tools could also be used to evaluate cash crop projects by checking whether the wealth-ranking factors have changed for better or worse or households have moved from one wealth status to another after the implementation of an agricultural

market development project. This is because agricultural market development projects aim to increase the income of smallholder farmers. This increased income could be used for routine household expenses while the extra income could be accumulated as household wealth in the form of increased cultivated land, increased number of livestock or/and increased hired casual labour cultivating the household fields.

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CHAPTER 7 : LABOUR ASPECTS INFLUENCING SMALLHOLDER FARMERS' MARKET PARTICIPATION IN NORTHERN MOZAMBIQUE[17]

Gastão Lukanu, Maryann Green & Steve Worth[18]

Abstract

Labour is one of the most important factors influencing smallholder participation. Crop Labour Requirements (CLR), Available Household Labour (AHL) and the ratio AHL/CLR were analysed using simple mathematical expressions and statistics on data collected from 287 respondent households in southern Niassa in Mozambique.

The study confirmed that, other factors being held constant, crop labour requirements were negatively related to market participation. Weeding was the most labour-intensive operation followed by harvesting, soil preparation, transportation of produces, land clearing and seedling preparation. Available household labour and the ratio AHL/CLR were positive related to market participation. The ratio AHL/CLR was used to estimate the potential total area a household could cultivate, both for food crops for consumption and cash crops. The equations developed in this study could be refined and used to estimate the proportion of farmers likely to participate in agricultural markets and/or those unable to cultivate enough for consumption under different scenarios that affected household labour availability, crop labour requirements and yield.

The study presented possible strategies to reduce crop labour requirements and increase the efficiency of use of available household labour based on literature review, field experience and smallholders' suggestions. They included improved cultivation power, improved agricultural practices, provision of inputs, provision of credit, improvement of access roads and establishment of buying networks at the village level.

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[17] *Submitted for publication in Development Southern Africa.*

[18] *Respectively, student, Professor and Senior Lecturer, School of Agricultural Science and Agribusiness, University of KwaZulu-Natal, Scottsville, South Africa.* *The cooperation of the farmers, João Ferreira dos Santos Company, German Agro Action, OXFAM and Acção Cristã Interdenominacianal da Saúde is gratefully acknowledged. We acknowledge the support from World Relief International and Swedish International Development Agency in Mozambique for letting the authors use WR-SempreVerde facilities to collect the data used in this study*

7.1 Introduction

This study was a part of an overall research project on factors that influenced smallholder market participation in northern Mozambique. The two earlier studies identified labour as one of the most important factors influencing market participation (Lukanu *et al*, 2004; Chapter 6)[19]. Similarly, Makhura (2001) also found that labour factors influenced market participation. Labour influenced market participation mainly through the size of the field that determined the amount of production (Larson and Frisvold, 1996). In places with abundant land, smallholders have been hindered from increasing field size due to labour limitations. Inadequate labour could limit the ability to sow a large area very quickly (Abalu *et al*, 1987).

Enete *et al* (2002) analysed the contributions of men and women to food crop production labour in Africa. These authors found that the relative number of households where females provided more field labour than males was higher among female-headed households than among male-headed ones. However, there was a need for more elaborate research on labour-related aspects taking into consideration the socio-economic and physical-compexity aspects of labour. Such a study would lead to greater understanding of how labour affected cultivation of cash crops and facilitate the formulation of proper strategies for helping smallholders to participate in agricultural markets. This study investigated how the independent and combined aspects of available household labour and crop labour requirements affected household involvement in the cultivation of cash crops[20] and subsequent market participation in southern Niassa. Specifically this study had the following objectives:

(i) To analyse the relationship between the crop labour requirements (CLR) and market participation;

(ii) To analyse the relationship between available household labour (AHL) and market participation; and

(iii) To analyse the relationship between the ratio AHL/CLR and market participation.

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[19] *Lukanu et al (2004) identified, in order of importance, the following factors influencing smallholders' decision to cultivate cash crops: (i) profitability, (ii) market access, (iii) availability of inputs and implements, (iv) labour and (v) access to extension services. In this study, smallholders reported that the number of effective labourers was the most determining factor that explained variation in market participation (Chapter 6).*

[20] *Cash crops in this study referred to any cropped products that smallholder could sell, be they food crops (maize, cassava, sorghum, Boer bean, cowpea or the like) or promoted cash crops (those crops promoted by specialised institutions specifically for cash such as tobacco, cotton, sesame, sunflower and paprika)*

7.2 Analytical methods

7.2.1 Theoretical Analysis

The study attempted to analyse three aspects of labour that were likely to influence market participation. They included the crop labour requirements (CLR), available household labour (AHL) and the ratio AHL/CLR. The first hypothesis of this study was that, with other factors[21] held constant, smallholder market participation (P) was inversely related to crop labour requirements where manual labour was the main source of energy. This inverse relationship could be expressed as follows:

$$P = f(1/CLR) \qquad 7\text{-}1$$

Crop labour requirements were the sum of labour requirements of different agricultural operations. These represented the physical-complexity aspects of agricultural labour.

The second hypothesis of this study was that, other factors held constant, smallholders market participation (P) was directly related to available household labour where manual labour was the main source of energy such as in northern Mozambique. This direct relationship could be expressed as:

$$P = f(AHL) \qquad 7\text{-}2$$

Available household labour was a function of effective household labour defined as the sum of the number of active household members (member of the household actively involved in agricultural activities) and external labourers (or "ganho-ganho") minus the numbers of household members working in other farmers' fields (Chapter 6). AHL represented the socio-economic aspects of agricultural labour. Households could increase the effective numbers of labourers by employing "ganho-ganho" and involving active household members working in their own fields as opposed to providing services to other households. Labour at such peak times as weeding represented a constraint for some smallholders (Jeje *et al*, 1998).

[21] *Factors such as crop profitability, buyers' availability, input availability, extension and livestock ownership also affected market participation.*

The third hypothesis of this study was that, other factors being held constant, the ratio AHL/CLR was positively related to smallholder market participation. This could be presented as follows:

$$P = f(AHL/CLR) \qquad 7\text{-}3$$

This ratio was likely to provide a better explanation of how labour influenced participation in the agricultural market because it combined the socio-economic and physical-complexity aspects of labour. For example, more smallholders would participate if their AHL was larger and the CLR was small. Figure 7-1 provides a synthesis of different labour aspects that were expected to influence market participation.

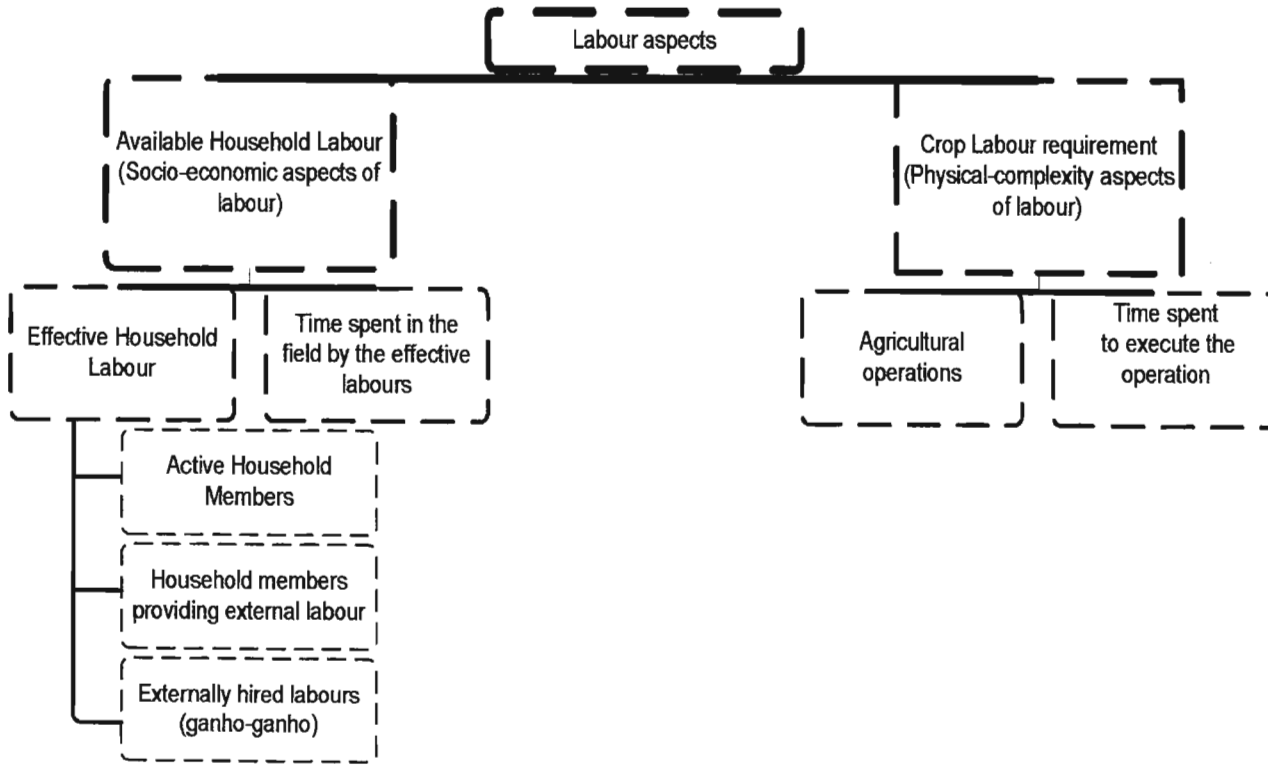


Figure 7-1. Labour aspects influencing smallholder participation in agricultural market

7.2.2 *Mathematical and statistical analysis*

Simple mathematical formulae were used to estimate crop labour requirements, household labour availability and the ratio AHL/CLR. The relationships between these labour aspects and market participation were analysed using:

(i) descriptive statistics;

(ii) correlation at $\alpha = 0.05$ to find the direction (positive or negative) and the strength of relationships between labour aspects and market participation; and

(iii) Z score tests to find whether there was a significant difference in labour aspects that contributed to differential participation between households of different wealth categories.

7.3 Aspects of Southern Niassa Cropping System that Affected Labour

A more detailed description of the study area can be found in Chapter 3. Southern Niassa had a population density of 13 people km^{-2} and land was a non-limiting factor (Instituto Nacional de Estatistica, 1997). However, households cultivated not more 2.45 ha because of limited effective household labour and use of inefficient agricultural implements such as hoes, machetes, axes and sickles, operated manually (PAMA, 2003). The average effective household labour in southern Niassa was 2.3 persons (Chapter 6). Smallholders used their labour resources firstly to cultivate food crops (maize, sorghum, cassava, Boer bean, cowpea and bambara nut) while any remaining labour was used to cultivate cash crops (food cash crops and promoted cash crops such as tobacco, cotton, sesame, sunflower and paprika).

The effective household labour could be increased by hiring casual labour. Carrilho *et al* (2003) reported that approximately 20 percent of Mozambican households employed casual labourers to work in their fields. However, casual labour was scarce during the peak period that coincided with the single rainy season between November and April (Figure 7-2). Household members preferred to cultivate their own fields during this period to guarantee household consumption. Only poor farmers and migrant labourers from neighbouring districts were available for hire. The neighbouring districts of Zambezia and Nampula provinces were sources of labour for Cuamba district. This is because the bigger economic markets in Cuamba[22] provided a greater attraction for labour. Wealthy farmers had resources to hire casual labour. However, the majority of poor households were too short of income and food to pay for casual labour.

[22] *More than 7 routes and railways from Nampula, Zambezia, Cabo Delgado and Niassa provinces as well as Malawi converged in Cuamba. Most of the agribusiness companies were based in the city of Cuamba. These conditions conferred on Cuamba a competitive advantage over the surrounding districts, allowing smallholders to employ "ganho-ganho" from people converging on Cuamba in search of better conditions. Newcomers often first worked as "ganho-ganho" before they cultivated their own fields in the following years.*

7.4 Methodology

7.4.1 Sampling Research Tools

A detailed description of methodology was discussed in Chapter 4. The research combined cluster and stratified samplings. The random selection of one or two villages for each of the six routes within Cuamba district ensured that the study results could be generalised for Cuamba and neighbouring districts. Nine focus group discussions (FGDs) involving key informants preceded the study, with traditional, church, mosque, political, government and other opinion leaders. The FGD also served as the basis for the design of questionnaires. A total of 287 household heads were selected to respond to a set of questions. In cases of absence, their spouses responded or consulted the members of the household for answers to questions they were uncertain about.

7.4.2 Data Collected

The following information was collected: farmers' perception of the most labour-intensive months, operations and crops within the agricultural calendar, the size of the household, the number of people, number of days and hours required to execute an agricultural operation, number of households not cultivating a cash crop due to labour constraints, household wealth status, and farmer-suggested strategies to alleviate labour constraints. This study analysed the labour aspects while other factors were held constant. This was assumed only for analytical purposes. The study, however, acknowledged the importance of other factors influencing market participation as indicated in other studies (Makhura, 2001; Matungul, 2002; Lukanu *et al*, 2004).

7.5 Results and Discussion

7.5.1 Perceived Labour Demand within Agricultural Calendar

Figure 7-2 provides information about farmers' monthly ranking of labour requirements within the agricultural calendar. All months with rankings[23] below 5.5 were considered the least labour-intensive months. Therefore, the months between March to September and between October to February were considered as the least and most labour-intensive months, respectively. Promoters often promoted their cash crops to be cultivated during October and February. This was the same period when smallholders grew food crops for consumption. Therefore, this situation created competition between food crops and promoted cash crops.

[23] *The interviewer asked the farmers to put the 12 months of the year in order according to labour demand and to rank them accordingly. The most labour demanding month was given the rank of 11 while the least labour demanding was given the rank of zero. Figure 2 represents the calculated average ranks for each month from different respondents.*

Figure 7-2 also shows different agricultural operations that a household can perform. The green shading indicates the month when smallholders were involved with certain activity. These operations started from clearing of land as early as March, harvesting of the products as late as September the following year followed by post-harvest operations (threshing, grading, transport and selling) in the following December. The most critical and intensive activities were performed in the labour-intensive months (Figure 7-2, operation in italics). It could be assumed that, other factors being held constant, farmers would be able to participate actively in the cash crop activities promoted during the dry months from March to September if provided with extension information and support on the use of small-scale irrigation technology.

7.5.2 Crop Labour Requirements

A. Estimation of Crop Labour Requirements (CLR)

Crop labour requirements in person days/ha (in a year or peak period) were calculated by summing the labour requirements of agricultural operations (LRAO) required from land clearing to selling of a cash crop. For each operation, the interviewers collected data about number of persons involved, number of months, number of weeks per month, number of days per week, and the necessary information to estimate the hours of work per day (departure, start-rest, end-rest, and returning times). This detail was necessary because some operations were spread over seven to nine months, with smallholders working intermittently (Figure 7-2). The details were also necessary to avoid errors when farmers were asked to recall the time used to perform each agricultural activity.

Farmers used different numbers of hours for different operations (Table 7-1), which meant that there was a need to standardise on an eight hour per day of work so that the labour for different operations and crops could be compared. A correction factor was calculated by dividing the average hours/day of work for each operation by eight hours/day of work, the Mozambican accepted working hours per day (Information from Labour Ministry Officer in Cuamba district). The eight working hours per day was introduced in 1919 in UK through the influence of industrial trade unions (Geary, 1997). Boeteng *et al* (1987) also defined one man-day to be eight hours/day of work per person. This standardisation of labour allowed the expression of all the labour as the number of days a smallholder would have worked if they

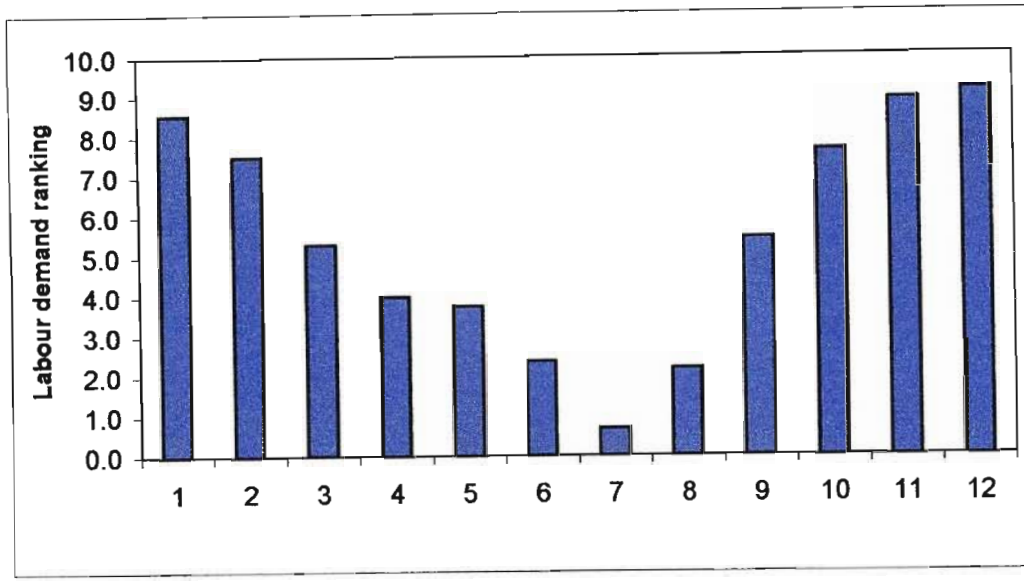
worked for eight hours per day. In summary, the labour requirements of an agricultural operation were estimated as follows:

LRAO = (Persons x Days x Hday/SDay)/(ha x year) [Person days/(ha x peak period)] 7-4

The ratio Hday/Sday represent the correction factor that transform the hours worked per day for each of the agricultural operation (Hday) to standard day (Sday) that has 8 hours per day. Table 7-1 provide data about the correction factors used to estimate labour requirements of agricultural operations.

B. Integrity and Validity of the Estimated Labour Requirements for Operation and Crops

The author acknowledges the difficulty of estimating labour requirements of agricultural activities based on farmers' accounts of time or periods to perform given agricultural activities. CLR data were compared with farmers' ranking of perceived labour demand for different cash crops (Table 7-2) to further confirm the integrity and validity of labour data assessed in the present study. There was significant (at $\alpha = 0.05$) and positive correlation ($R = 0.731$, critical $R = 0.700$) between the crop labour requirements (as calculated above) and farmers' ranking of labour demand. This result showed that the estimated CLR represented the amount of labour required to cultivate a given crop. Farmers under-ranked the labour demand for food crops (see the discrepancy between the days worked and the ranking given) because of their greater experience and the importance of food crops. Labour was perceived as not only a time issue, but also an emotional issue. It was harder to do a job that was unfamiliar, unpleasant or boring such as a weeding or learning the skills of preparing good seedlings for paprika. Therefore, these aspects of labour would also affect smallholders' cultivation of a given cash crop and subsequent participation in its market.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tree cutting												
Land Clearing												
Soil preparation												
Seedling preparation												
Sowing of early crops												
Sowing of late crops												
Transplantation												
Fertiliser application												
First weeding												
Second weeding												
Third weeding												
Pest and disease control												
Dryer preparation												
Harvest												
Threshing												
Drying of products												
Transport to the village												
Grading												
Bagging and storing												
Transport to the market												
Vegetable production												
Sugar cane production												

Figure 7-2. Monthly ranking of labour demand and agricultural operations through the year in southern Niassa.The green shadings indicate the months when smallholders are involved with agricultural activities. The operations in italic are the most critical and the most labour demanding operations (n=16; Cuamba, October 2002).

Table 7-1. Labour requirements of agricultural operations, cash crops, and time (hours) needed to perform agricultural operations. The operations in italics are the most critical and the most intensive operations (n = 16, Cuamba, October 2002).

	Hour/ day	Correc- tion factors[1]	Average number of people involved	Food crops[2]	Tobacco	Cotton	Sesame[3]	Sun- flower[3]	Papri -ka	Farmers indicatin g labour (%)
Land Clearing/tree cutting	5.8	0.7	1.5	32	32	32			32	7
Seedling	4.4	0.6	1.3		8				8	5
Ridge making[4]	4.3	0.5	1.8		21				21	
Soil preparation	4.3	0.5	2.0	30	30	30			30	9
Sowing of early crops	*4.3*	0.5	*2.4*	*12*		*12*				
Sowing of late crops	*3.3*	0.4	*2.4*	*12*			*12*	*12*		
Transplantation	*4.4*	0.6	*2.4*		*10*				*10*	
Fertiliser application	*2.4*	0.3	*1.0*		*3*	*3*			*3*	
First weeding	*6.8*	0.9	*2.0*	*41*	*24*	*40*			*36*	*43*
Second weeding	*4.6*	0.6	*2.0*	*22*	*15*	*22*	*15*	*15*	*21*	
Third weeding	*4*	0.5	*2.4*			*14*	*14*			
Thinning	*3.5*	0.4	*2.2*			*17*	*8*	*9*		
De-budding	*3.5*	0.4	*1.8*		*7*					
Pest and disease control	*2.9*	0.4	*1.0*		*4*	*4*			*4*	
Harvest	4.2	0.5	2.1	24	71	35	17	19	13	19
Threshing	1.8	0.2	1.8	18			3	2		
Dryer preparation	5.4	0.7	1.5		20				11	5
Drying of products	7.7	1.0	1.5		18				15	3
Transport to the village	3.4	0.4	1.8	17	46	25	1		10	9
Grading	5.3	0.7	1.9		23	15			15	
Bagging and storing	4.2	0.5	1.0	3	3	3	3	3	3	
Transport to the market	3.8	0.5	1.5	2	2	2	1	1	2	
Total person days/(ha x year)				**213**	**337**	**254**	**74**	**61**	**234**	
Total person days/[ha x (Oct-Feb)]				**87**	**226**	**112**	**49**	**36**	**74**	

[1] *Correction factor obtained by dividing the number of hours/days worked by 8 hours/ day*

[2] *Food crops include maize, cassava, sorghum, Boer bean and cowpea.*

[3] *Sesame and sunflowers are often intercropped in food crop fields; therefore there was no need for land clearing, soil preparation and first weeding.*

[4] *Used hours of days worked for soil preparation.*

Table 7-2. Estimated crop labour requirements and farmers' ranked labour demand for different cash crops (1 = least labour intensive while 6 = most labour intensive, n = 16, Cuamba, September 2002).

	Crop labour requirements [person days/(ha year)]	Labour demand ranking[1]
Food crops	213	1
Tobacco	337	6
Cotton	254	5
Sesame	74	3
Sunflower	61	1
Paprika	234	4
R		0.731
Critical R ($\alpha = 0.05$)		0.700

[1]*The labour demand rankings were calculated as the average ranks from the 16 respondents.*

C. CLR and Market Participation

The first hypothesis was that, other factors being held constant, labour requirements would be negatively related to market participation. In other words smallholders would be less likely to cultivate cash crops with high demands for labour. Tobacco cultivation was the most labour-intensive of all of the cash crops [(337 person days/ha (in a year)] (Table 7-1). Sunflower [61 person days/ha (in a year)] and sesame [74 person days/ha (in a year)] were the least labour-intensive crops when intercropped with maize, which was the common practice in southern Niassa. Cotton [254 person days/ha (in a year)] and paprika [234 person days/ha (in a year)] were second and third most labour-intensive crops, respectively. The labour for intercropped maize with other food crops was 213 person days/ha (in a year). The crop labour requirements during peak periods (Table 7-1) would determine how much land a household could farm (control), the amount of food crop for consumption and cash crops it could produce, and subsequently its participation in agricultural markets. It was important to stress that allocation of resources for the cultivation of food crops for consumption was the primary choice for smallholders (Ministério de Agricultura e Pescas, 1996). Farmers then ventured into cash crops only if they had access to additional labour.

There were more smallholders marketing tobacco (40%) in spite of it having high labour requirements or being ranked as the most labour demanding crop. Profitability of the crop, input support, technical assistance and buying services influenced farmers to use their additional resources (after deducting those used to cultivate food crops for the household) to cultivate and market tobacco rather than sunflower and sesame, that had lower labour

requirements per hectare (more detail about other factors influencing smallholders' participation in agricultural markets will be discussed in Chapter 8).

The percentage of households not cultivating a given cash crop due to labour constraints was significantly and positively related to labour demand as ranked by the farmers (R = 0.826, critical R = 0.700) (Table 7-3). Therefore, other factors (such as profitability, accessibility to inputs, credit, extension and markets) being held constant, labour demand was negatively related to cash crop cultivation and subsequently to market participation in confirmation of the first hypothesis. However, a positive but non-significant correlation was found between the percentage of farmers not cultivating a specific crop and the calculated crop labour requirements (R = 0.451). This poor correlation resulted because the calculated crop labour requirements, based upon time, did not take into consideration the smallholders' experience, the importance of food crops and the emotional and psychological (non-physical) aspects of labour that influenced farmers' decision to cultivate a given cash crop. Farmers rejected and/or discontinued the cultivation of a given crop based on their perception of the labour demand. For example, farmers considered seedling preparation for tobacco as more labour demanding (8 person days/ha) than transportation of tobacco from the field to the village (46 person days/ha) or preparation of tobacco dryers (20 person days/ha). The skill and discipline required to prepare healthy seedlings and the constraints to finding a secure source of water for irrigation of seedlings were some of the factors that made smallholders feel that seedling preparation was more labour demanding than the above-mentioned activities. Table 7-3 also shows that labour was the primary factor influencing farmers' rejection and/or discontinuation of tobacco and cotton while it was a secondary factor in relation to sunflower, sesame and paprika cultivation.

Table 7-3. Farmers not cultivating due to labour demand, the estimated crop labour requirements and the farmers' ranked labour demand (n=16; Cuamba, September 2002).

	Not cultivating (%; n = 287)	Not cultivating due to labour demand (%)	Crop labour requirements [person days/(ha year)]	Labour demand ranking	Importance of labour in relation to other factors[1]
Tobacco	60	56	337	6	1
Cotton	77	41	254	5	1
Sesame	93	24	74	3	2
Sunflower	95	28	61	1	2
Paprika	99	24	234	4	2
Food crops	0	0	213	1	
Correlation Coefficient			0.451	0.826	
Critical R (95%)			0.700	0.700	

[1] *The number in the column suggested that labour was the most important factor for tobacco and cotton while second for sesame, sunflower and paprika (information from Table 5-12).*

D. Labour Requirements for Different Agricultural Operations

An attempt was made to assess the most labour-intensive operations based on estimated labour requirements and farmers' ranking of the labour demands for different agricultural operations on a hectare of land. According to farmers, weeding was the most labour-intensive operation followed by harvesting, soil preparation and transportation of products, land clearing and seedling preparation. Farmers' ranking of operations in terms of labour demands did not correlate significantly (R = 0.301, critical r = 0.700) with the estimated labour requirements of operations. Farmers took into consideration not just the amount of time required but also the intensity, the pain, the complexity of operations, the experience as well as the emotional and psychological factors when ranking the labour demand of agricultural operations. Nevertheless, both ranking and labour estimations were used to explain labour requirements of agricultural operations.

(a) Weeding

A considerable percentage (43%) of the farmers indicated that weeding was the most intensive operation during the peak period. Smallholders reported that they worked under stress during weeding because weed growth overtook their capacity to keep the weeds down. Given that land was not a limiting resource, weeding determined the size of the cultivated land in southern Niassa. Smallholders were less likely to clear and prepare more land during less labour-intensive months when they knew that they would only be able to weed 2.45ha during the peak period (the average field size according to PAMA 2003). Chatizwa and

Vorage (2000) and Mganilwa *et al* (2003) reported similar experiences in Zimbabwe and Tanzania where smallholders experienced serious labour bottlenecks at weeding times.

On average farmers required two weedings for most crops and three for cotton. The total labour requirements for weeding operations were more intensive for cotton (76 person-days/ha) followed by food crops (63 person-days/ha), paprika (57 person-days/ha), tobacco (39 person-days/ha), sesame (29 person-days/ha) and sunflower (63 person-days/ha). Weeding demanded about 27 percent of agricultural labour (among cultivation, post-harvest and marketing operations) in southern Niassa. Riches *et al* (1997) indicated that weeding accounted for up to 60 percent of labour used in maize cultivation in Zimbabwe. The intensity of the weeding operation could also be observed by the number of working hours per day (6.8) and days per week (7) required. Farmers also reported that the body position from which they weeded caused pain. They used a hoe and bent about 70 - 90° to weed. This painful body position was a function of the technology in use in southern Niassa.

The period of the first weeding was characterised by intense precipitation that could last ten or more successive days without stopping. According to smallholders, rain was counter-productive to weeding as it caused delays and made the weeds grow rapidly. The first two weeding operations were performed in the hungriest period (November to February; see Table 7-2) when farmers' body energy levels were lowest due to limited food availability at the household level. During this period, farmers were also prone to diseases (cholera and malaria) because of increased virulence of micro-organisms and because of low body resistance caused by poor nutrition. Household capacity to weed larger areas was likely to be positively related to household market participation because weeding limited the area a household could cultivate, and therefore limited the quantity of outputs.

(b). Harvesting

Harvesting was quoted as the second (19%) most labour-intensive operation. It was particularly intensive in the case of tobacco (71 person days/ha) with cotton (35 person days/ha), food crops (24 person days/ha), sunflower (19 person days/ha), sesame (17 person days/ha) and paprika (13 person days/ha) following. Five percent of farmers indicated that they needed to hire "ganho-ganho" for harvesting. They also pointed out that the body position (similar to weeding) required for harvesting some ground products such as cowpeas and bambara nuts also caused pain. Farmers indicated that some crops such as bean and

sesame needed to be harvested early in the morning and in the shortest period possible to avoid losses. This caused farmers to cultivate just enough of what they would be able to harvest, thus limiting the quantity of outputs and subsequent market participation of such crops.

(c). Soil preparation

Thirdly, farmers pointed to soil preparation as one of the very intensive operations. Thirty person-days/ha were required to prepare the soil using hoes to cultivate the cash crops discussed in this study. More than 17 percent of the respondents indicated needing "ganho-ganho" for soil preparation. Like weeding, farmers recognised that manual soil preparation was very strenuous given the bodily position and the energy required for removing grass and roots, and ploughing to a reported depth of 0.2 m.

(d). Transportation of products from the field to the villages

Similarly, farmers identified transportation of their outputs from the field, and from villages to the market as labour-intensive. Farmers made many trips to transport their products by foot, carrying loads on their heads, or by bicycle from the field to the villages. Tobacco absorbed the most transportation labour (48 person-days/ha) compared to cotton (25 person-days/ha), food crops (17 person-days/ha), paprika (10 person-days/ha), sunflower (2 person-days/ha) and sesame (1 person-days/ha).

(e). Land clearing

Tree-cutting and land clearing was indicated as the next most labour-intensive operation according to the farmers. This operation required an average of 32 person-days/ha. Although painful (to hands, ribs and chest), tree-cutting operations were rarely performed under stress as farmers could start this as early as March and finalise in September (Figure 7-2). Smallholders also indicated that tree cutting from a virgin field was a very dangerous operation as one could be trapped by falling trees. A small proportion of the farmers (6%) indicated that they needed to hire "ganho-ganho" to perform tree-cutting operations.

Three-cutting was exclusively masculine work. Therefore, female-headed households had to pay for "ganho-ganho" to clear trees from the land. In general, households preferred to use land that had already been cleared to cultivate promoted cash crops than to open new field.

(f). Seedling preparation

Tobacco and paprika growers also pointed out that seedling preparation was a very complex operation. However, this operation required only eight person-days/ha. Farmers were required to water twice daily during the dry period. Experience from NGOs promoting paprika indicated that farmers lost most seeds and seedlings because of poor performance in their seedling preparation. Some plants died due to lack of water or poor pest control; some seeds and seedlings were washed away by floodwater because seedbeds were set too close to the river banks.

(g). Summary

Helping smallholders to reduce labour load of agricultural operations, mostly weeding, during the peak period would encourage them to cultivate and participate more in agricultural markets. Harvesting labour also limited the area that a household could cultivate with crops that required speedy harvesting such as sesame and beans. Helping farmers to alleviate labour demands due to weeding (and also harvesting for some crops) would encourage farmers to clear more land and prepare the soil for planting during less labour-intensive months. One needs also to look at ways to reduce labour for land clearing, soil preparation and transportation.

7.5.3 Available Household Labour (AHL)

A. Estimation of AHL for the Year or Peak Period

On average farmers worked between 05H00 and 12H00 during the day with a one-hour break, while tobacco growers worked between 06H00 and 16H00 with a two-hour break between 12H00 and 14H00. Farmers often avoided working under intense solar radiation between 12h00 and 14h00, a common characteristic in Sub-Saharan Africa (Haque *et al*, 2000). On average farmers worked for six days per week. However, during peak periods some farmers worked for seven days per week including religious holidays.

The annual or peak AHL was estimated by multiplying the number of effective household labourers by the number of days of work per annum or peak period. The number of days was estimated as follows: (i) 52 week/year x days/week when estimating the annual household labour availability; or (ii) 16 week/(peak period) x days/week when estimating the peak period household labour availability. Farmers' working time was converted to eight hours per

day[24]. The correction factor "Hdays/Sday" was used to report days of 8 hours of work. Therefore, annual household labour availability (AHL) was estimated as follows:

AHL = persons x days/year x Hdays/Sday 7-5

The interviewed smallholders worked on average 7.2 hours per day.

B. Available Household Labour and Market Participation

The average available annual and peak household labour was 652 person-days/year and 201 person-days/peak period, respectively. The available peak household labour should have determined the field size that a household could cultivate during a growing season. Available annual and peak labour were positively (R = 0.75) and significantly related (at $\alpha = 0.05$) to the number of cash crops sold in support of the second hypothesis of this study. Households with less labour available were less likely to cultivate cash crops (as they will first prioritise food crops for consumption). It was also important to stress that households had a potentially untapped labour availability during the dry season that could be used for cash crop cultivation (see Figure 7-2, the empty space in bolded operation performed during peak period)[25].

7.5.4 The ratio AHL/CLR and Market Participation

The ratio between available household labour and crop labour requirements was likely to be one of the best indicators of labour influence on market participation. The ratio between household labour and crop labour requirements during the peak period could be used to estimate the potential area that a household could cultivate[26].

AHL/CLR = person days /peak period / person days/(ha x peak period) = Area in ha 7-6

This equation was based on the assumption that household labour availability during the peak period would limit the area that a household could cultivate mainly due to limited capacity to

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[24] *This correction was necessary so that labour/wages per day of people working in smallholders' fields could be compared with labour of people working on commercial farms. Details of how the effective household labour used their time and days can be found in Figure 6-2 (spread along the year) and Table 6-1 (hours/days).*

[25] *However, smallholders performed some specific non-farming activities during the dry season such as building of houses, traditional ceremonies, hunting and others. These activities need to be investigated if one is to recommend promotion of cash crops during dry seasons.*

[26] *The estimated area from this equation needs to be tested with experimental data for possible correction. However, this will not be done in this study, except for an attempt to compare the estimated data with field size data from literature or from promoter institutions.*

weed a greater area. It also assumed that the entire available household labour during the peak period was used for agricultural activities.

A. Estimating the Cultivated Area

Table 7-4 shows the estimated size of the field if the entire available household labour was used to cultivate a given cash crop of known labour requirements during a peak period. This estimate suggested that on average a household could manage 2.3 ha of land if it cultivated only food crops. This estimate was very close to the measured area of 2.45 ha distributed in 2.5 fields per household for Cuamba district (PAMA, 2003).

B. Area Required for Food Crops for Consumption

According to Akesson (1994), a household with an average of 4.8 adult members per household could consume 715 kg of maize per year (4.8 people x 150 kg/year). According to Lukanu *et al* (2004), households gave priority to food crop cultivation before planning to cultivate a cash crop. With an average yield of 600 kg/ha, a household will need 1.2 ha per year to produce 715 kg of maize required for consumption (715 kg/year/600 kg/ha year) (Akesson, 1994). This household would reserve 104 person-days/peak period to cultivate food crops for consumption (1.2 ha x 87 person-days requirements for food crops – see Table 7-1). The remaining 97 (201 – 104) person-days/peak period could be used to cultivate a cash crop. The estimate of 1.2 ha of land using the equation above was close to PAMA's (2003) measured area of 1.22 ha a household used to cultivate food crops for consumption (0.72ha for maize fields and 0.5ha for other food crops).

Consumption requirements by poor (701 kg/year) and wealthy (808 kg/year) households were not statistically different. Logically, poor households' production was lower because of the smaller size of the cultivated fields due to the limited available household labour (Table 7-4). The average household size was 4.80 persons, 4.68 persons for poor and 5.39 persons for wealthy households (Chapter 6). Estimates suggested that poor households would employ only 30 percent of their cultivated land to produce cash crops compared to 50 percent by middle class and 70 percent by wealthy households because of limited available household labour (Table 7-5). That is, poor households used a larger proportion of their available household labour to produce food for the household as opposed to wealthy households. This

percentage was based on the estimate of available household labour, food requirements and land area needed to produce for consumption for each wealth status category (Eq. 7-6).

C. Area Required for Promoted Cash Crops

The estimates also suggested that if a household used all the remaining available labour during the peak period it would have cultivated 1.1 ha of food cash crops (2.3 – 1.2 ha, or 97/87 ha - based on available person days/peak period) or 0.4 ha of tobacco, 0.9 ha of cotton, and 1.3 ha of paprika. These areas varied because of differences in crop labour requirements. The correlation between the estimated area and the number of cash crops sold was positive and significant (R = 0.151, critical R = 0.115). That is, the ratio AHL/CLR, or the estimated land area were positively related to cash crop cultivation and subsequently to market participation in support of the third hypothesis of this study (see Table 7-4).

Estimated data of potential field size for different cash crops were compared with the assessed data from literature and information from promoting institutions to assess the validity of the concepts and equations developed in this study. The PAMA's (2003) assessed land size of 1ha for cotton was very close to the 0.9 ha estimated using Eq. 7-6. According to JFS Company senior staff, each farmer cultivated on average about 0.3 ha of tobacco in southern Niassa. This data was also close to the estimated average of 0.4 ha for tobacco. There were no independent assessments of cultivated areas for sesame and sunflower. Nevertheless, Eq. 7-6 could be used to estimate the area that a farmer was likely to cultivate for different crops given that the equation estimated the total area, the area households used to cultivate food crops for consumption, and the average area used to cultivate cotton and tobacco. However, it was important to stress that on average households used their available labour to cultivate 1.77 ha of cash crops (food cash crops and/or promoted cash crops) (see Table 5-10). Therefore, the suggestion that a household would use all its remaining available labour to cultivate a single cash crop was hypothetical, just for analytical purposes.

D. Proportion of Farmers Likely to Cultivate Cash Crops

Estimates using the equations above suggested that 32 percent of the sample (n = 287); 40 percent of poor (n = 145), 28 percent of the middle class (n = 106) and 14 percent of wealthy (n = 37) households would have insufficient labour to cultivate a field size that would allow them to produce cash crops in addition to food crops (Table 7-5). These values compared well with households that did not sell any crops based on the survey (R = 0.846, critical R =

0.881, slope = 1.016, intercept = 0.041). This further confirmed the importance of labour aspects for market participation and the validity of the concepts and equations developed in this study to estimate labour, the size of the fields for both food crops for the household and cash crops, and the proportion of farmers likely to participate in markets.

Estimates also suggested that 26 percent of the sample had insufficient labour to produce enough food crops for own consumption. Van Zyl and Coetzee (1990) reported data for Zimbabwe (15-26%) that were similar to this estimate. This suggested that one could estimate the percentage of people likely to participate in agricultural markets, and those who were food insecure based on labour data, yield and the size of the household. According to Van Zyl and Coetzee (1990) the proportion of deficit producers could double in a year of low rainfall due to poor yields. These households were then less likely to participate in markets because their main goal was to produce food for consumption using their limited labour resources. Van Zyl and Coetzee (1990) reported that such producers were also less likely to respond to price incentives.

Table 7-4. Estimated potential total area and the areas required for food crop for consumption and cash crops by smallholder farmers in Cuamba .

	WEALTH STATUS	AHL PEAK PERIOD (Person days)	POTENTIAL AREA IF ALL PEAK AHL USED FOR FOOD CROPS (Ha)	ANNUAL MAIZE FOR HOUSEHOLD CONSUMPTION[1] (kg)	AREA FOR FOOD CROP FOR CONSUMPTION[2] (Ha)	AREA FOR FOOD CASH CROPS (Ha)	AREA FOR TOBACCO (Ha)	AREA FOR COTTON (Ha)	AREA FOR PAPRIKA (Ha)
Mean	**Sample**	201	2.3	715	1.2	1.1	0.4	0.9	1.3
	Poor	153	1.8	701	1.2	0.6	0.2	0.5	0.7
	Middle class	219	2.5	710	1.2	1.3	0.5	1.0	1.6
	Wealthy	336	3.9	808	1.3	2.6	1.0	2.0	3.0
Standard deviation (σ)		205.24	2.36	339.69	0.56	2.25	0.66	1.75	2.64
Test statistics, z	**Wealthy vs poor**	4.79	4.79	1.69	1.69	4.60	4.60	4.60	4.60
	Wealth vs. middle class	2.94	2.94	1.51	1.51	2.71	2.71	2.71	2.71
Critical z	**Lower**	1.96	1.96	1.96	1.96	1.96	1.96	1.96	1.96

[1] *Maize has been used as the main staple food crop; it is assumed that each adult person can consume 150 kg of maize/year; it has been also assumed that each household member is an adult with the capacity to consume 150 kg of maize/year (Akesson, 1994).*

[2] *An average of 600 kg/ha has been assumed as the yield of maize in Southern Niassa (Bias and Donovan, 2003).*

Table 7-5. Estimated impact of labour on land area, food crop cultivation for consumption and cash crop cultivation for smallholders in Cuamba.

	AREA NEEDED TO CULTIVATE MAIZE FOR CONSUMPTION	PROPORTION OF TOTAL LAND USED FOR FOOD CULTIVATION	AREA REQUIRED TO CULTIVATE FOR FOOD CASH CROPS	PROPORTION WITH NO LABOUR TO CULTIVATE ADDITIONAL AREA FOR SURPLUS	PROPORTION WITH LESS AREA TO PRODUCE FOOD CROP FOR CONSUMPTION
WITH YIELD OF 600 KG/HA OF MAIZE					
Average	1.2	0.5	1.1	0.32	0.26
Poor	1.2	0.7	0.6	0.40	0.35
Middle class	1.2	0.5	1.3	0.28	0.21
Wealthy	1.3	0.3	2.5	0.14	0.14
WITH YIELD OF 1800 KG/HA OF MAIZE DUE TO USE OF INPUTS AND LABOUR SAVING TECHNIQUES					
Average	0.4	0.2	1.9	0.19	0.19
Poor	0.4	0.2	1.4	0.25	0.25
Middle class	0.4	0.2	2.1	0.13	0.13
Wealthy	0.4	0.1	3.4	0.11	0.11

E. Summary about Estimates

The combination of available household labour and crop labour requirements during the peak period determined the size of the land that a household could cultivate. A household would only open a field that it was able to control (mainly weeding) during the peak period. The size of the field would dictate how much land a household could assign to cash crops after deducting the land required for food consumption. That is, the size of the field cultivated would determine smalllholders participation in agricultural markets.

A farmer may not participate in agricultural markets, even if s/he wanted to, because of the labour limitation. Labour was the most important factors in southern Niassa and it would determine who could participate in agricultural markets. This is because to participate in the agricultural markets, a smallholder needed first to cultivate using his available household labour. This was the logic. If there was not enough labour to cultivate ? then there was no need to dream of selling even if other factors influencing market participation were good. Support also came from the Ministério de Agriculture e Pescas (1996) that reported findings from Cabo Delgado and Nampula provinces (part of Agro-ecological zona number 7 where southern Niassa is part) about farmers' food crop vs cash crop strategies: " The strategies of sampled household emphasize firstly (primordially) food security, but they are open to cash crops when there is enough available work force." To improve market participation, one needed to increase the quantity and/or the efficiency of available household labour and/or reduce the crop labour requirements during the peak period.

Assumptions and equations developed in this paper could be used to estimate the size of the field and the proportion of households likely to participate in agricultural markets using a simple expression that involved socio-economic data. These data included amongst others: household size, maize consumption per adult person per year, total available household labour during peak period, the remaining available household labour after deducting that needed to cultivate food crops for consumption, crop labour requirements for food crops and promoted cash crops during peak periods. The correlation between estimate and survey data was significant at $\alpha = 0.05$ (Table 7-6).

Table 7-6. Comparison of estimated data using socio-economic data and survey data or data obtained from literature review.

	ESTIMATE	SURVEY	SOURCES
Total area (ha)	2.3	2.45	PAMA (2003)
Area of food crop for consumption (ha)	1.2	1.22	PAMA (2003)
Area for cotton (ha)	0.9	1	PAMA (2003)
Area for tobacco (ha)	0.4	0.3	JFS-SAN Company
Households not participating in the market (%)	32	26	Chapter 6
Poor households (%)	40	37	Chapter 6
Middle class households (%)	28	17	Chapter 6
Wealthy households	14	17	Chapter 6
R Coefficient		0.979	
Critical R (95%)		0.625	
Slope		1.162	

7.6 Suggested Strategies for Alleviating Labour Obstacles

Some of the problems experienced by smallholders in southern Niassa included a shortage of effective household labour, specifically a lack of money to hire labour and a lack of casual labour available during the peak period. Young people saw the provision of agricultural labour as a temporary job because of the poor remuneration in relation to other sectors (Chapter 6). Labour shortages and capacity in southern Niassa would also be aggravated because of HIV/AIDS which affected about 16 percent of the population (PAMA, 2003). Therefore, transformation of smallholder agriculture would require technology that allowed the output to increase with reduced labour, or technology that would increase the efficiency of labour. There was a need for analysis relating to possible strategies for alleviating agricultural labour requirements. The following were some of the suggested strategies based on literature, experience in the area, interpretation of the findings of this study and farmers' recommendations. Overall, most solutions suggested by

smallholder farmers were dependent on outside interventions from promoting institutions, NGOs or government rather than from the farmers' own initiative.

7.6.1 Improved Cultivation Power

A. Provision of Agricultural Mechanised Services

Some farmers (7%) suggested that they would like to hire or buy tractors or motor-cultivators on credit to alleviate labour obstacles related to weeding and soil preparation operations. This small percentage of the farmers requesting tractors suggested that this was a little known technology probably due to limited resources, unavailability of tractors and lack of experience. Mganilwa *et al* (2003) discussed a motor-cultivator in Tanzania with the capacity to weed 1.4 ha/day, 20 times faster than hand-hoe weeding. However, use of tractors or motor-cultivators required operation by well-trained people, maintenance and management knowledge; motorised traction had high initial costs and fuel use; and there was a lack of fuel and spare parts for maintenance in rural areas (Haque *et al*, 2000). An analysis of the feasibility of this strategy in reducing labour demand would be needed to secure a successful and sustainable implementation of mechanised services in rural areas.

B. Draught Power

No farmers referred to draught power (using of animal for cultivation or transportation of agricultural products) when asked about potential strategies to overcome labour obstacles to crop cultivation. This is because use of animal traction was not part of the farming systems in southern Niassa. Nevertheless, animal traction remained the most economic and appropriate source of energy for smallholders (Devendra and Thomas, 2002). Tractors cost possibly five to six times more than the cost of animal traction. According to Haque *et al* (2000) an animal drawn implement was capable of providing equivalent labour of one person-day/ha instead of 30 person-days/ha for soil preparation using manual labour. According to Chatizwa and Vorage (2000), animal powered implements could reduce weeding labour by 50-70 percent compared to hoe weeding. An analysis of the feasibility of draught power on aspects relating to grazing area, diseases and the cost of running animal traction would be needed before any recommendation could be made about the introduction of cattle for traction.

7.6.2 Improved Cropping Practices

A. Intercropping and Late Season Crops

Intercropping was part of the cropping system in southern Niassa. Farmers intercropped maize with beans partly with the aim of reducing the crop labour requirements for a particular crop. For example, sesame or sunflower intercropped with maize would not require any additional land clearing and soil preparation because these crops were sown in the maize field when most of these operations have already been executed.

Labour could be spread throughout the agricultural season and reduced when smallholders performed relay intercropping where additional crops were introduced at a later stage of cropping. Sesame and sunflower were late season crops that could be sown up to the beginning of February when farmers were under less labour pressure. This strategy was likely to facilitate weeding, harvesting and other agricultural operations. There was a need to find an efficient intercropping system that, apart from reducing the labour requirements, would secure both food and cash. Joseph (1987) found this method more rational (economic and labour) for small-scale farmers than the mono-cropping system.

B. Promotion of Off-Rainy Season Cash Crops

The majority of the respondents (94%) indicated that they would like to cultivate vegetables, followed by food crops such as maize, pumpkin, and bean (31%), and late season crops like sesame, cowpea, Boer bean and sunflower (19%) during the dry season. Off-rainy season crops would shift cash crop labour from the rainy to the dry season reducing competition between cash and food crops for labour; mobilizing smallholders' available and untapped labour during the dry season; and increasing crop yields and annual outputs. Cultivation during the dry season could be performed on lowland[27] that held enough soil water to sustain crop growth or under small-scale irrigation schemes. However, it was important to stress that during the dry period farmers used their time for hunting, fishing, performing post-harvest operations, land clearing, building and maintaining houses. Therefore, a feasibility analysis would be needed to determine the possibilities of involving smallholders during the dry season cultivation before any investment was recommended.

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[27] *Lowland is land near a superficial or groundwater source that enables the maintenance of the soil with enough water to sustain crop production during the dry season.*

C. Promoting Crops with Less Time-stressed Limits for Harvesting

Some crops such as maize, paprika and cassava could be harvested when smallholders were ready as opposed to crops such as sesame, Boer bean and cowpea that had to be harvested when the crop was ready in order to avoid deterioration and losses. By cultivating crops with less time-stressed limits for harvesting, smallholders could delay harvesting for periods when other labour requirements were lower.

E. Communal and Promoter Controlled Seedlings

One of the strategies for reducing labour requirements for seedlings consisted of the promoters preparing or supervising the seedlings that would be sold to inexperienced farmers until they had learnt to prepare seedlings by themselves. This action could minimise the crop labour requirements related to seedling operation, reduce losses of seed and seedlings and ensure that farmers received good seedlings. When accompanied by appropriate training, farmers could become less dependent on the promoters and become self sufficient and experienced in seedling operation. This could lead to reduced complexity of preparing seedlings and subsequently lower labour requirements for both promoters and farmers.

7.6.3 Improving Availability and Access to Inputs

A. Availability and Access to Agricultural inputs and Use of Good Cropping Practices

JFS Company provided fertilisers, chemicals and seeds on credit for the cultivation of tobacco and cotton. According to farmers (30%) it was quite impossible to get a significant yield from tobacco if they did not apply fertilisers and chemicals. By using inputs and appropriate agricultural services for both food and cash crops, households could increase yields, use less of their available labour to cultivate food crops for consumption while using the remaining labour to cultivate cash crops. Inputs and appropriate practices could include high yielding and resistant seeds, inorganic and organic fertilisers, crop rotation with special fallows, conservation farming and irrigation. Data in Table 7-5 provide a hypothetical situation where maize yield was increased from its actual yield of 600 kg/ha to 1800 kg/ha[28] with utilisation of improved agricultural practices. These practices could involve early sowing, timely weeding and soil and water conservation practices that did not require additional costs.

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[28] *1800 kg was still within the yield range that smallholders in Southern Africa could cultivate (Tickner et al, 2001)*

The above hypothetical situation would bring the following benefit that affected labour assigned to cash crops (Table 7-5):

(i) Reduce the average area required to cultivate food crops for consumption from 1.2 ha to 0.4 ha;

(ii) Increase the average area used to cultivate food cash crops from 1.1 ha to 1.9 ha;

(iii) Decrease the proportion of households with insufficient labour to cultivate a food cash crops from 32 percent to 19 percent; and

(iv) Decrease the proportion of households with insufficient labour to cultivate enough food crops for consumption from 26 percent to 19 percent.

Unfortunately, currently no fertiliser was provided on credit for food crops, and there were not enough animals to provide enough manure. Appropriately timed sowing and weeding were not practiced to increase yields.

B. Use of Herbicides and No-tillage Technology

Acording to Abalu *et al* (1987), use of herbicide technology (chemicals used to control weed) would seem to offer the best prospect for weed control. The Government Extension Service in Niassa province has been recommending herbicide use (in Lichinga Area) to control weeds. Although the results from field demonstrations were impressive, there was no guaranteed supply of herbicide. A feasibility study would be needed to determine the effect of herbicides in minimising weeding labour requirements, the effect on health and safety, the environmental sustainability, and farmers' resources constraints and economic impacts. Other aspects would involve an analysis of the applicability of herbicide on mixed crops. There was also a need for analysing aspects related to costs.

7.6.4 Provision of Credit

Ninety-one percent of respondents indicated that they needed credit to pay for some of the agricultural operations to alleviate labour demands. Respondents were already providing food (93%), drink (36%), money (34%), clothes and other manufactured articles (7%) and tobacco (2%) to casual labour in exchange for work. Some farmers requiring external labour kept excess food to exchange for work. However, external labourers were scarce during peak periods. Farmers would need credit to pay for mechanised services and inputs that would reduce labour requirements. However, it was necessary to link loans to agricultural services, inputs provision and buying of harvest to guarantee the loan repayment.

7.6.5 Improving Access Roads

The Niassa government recommended that villages were located close to the main roads where they could have access to transport facilities. Access roads near the villages would allow smallholders to increase the chances of selling their products in the villages without necessarily having to transport them to distant market places. However, buying points needed to be established closer to more villages using local buyers, farmers' associations, or traders. This would reduce the amount of time taken to transport goods to market places.

7.7 Conclusions

This study has investigated three labour concepts: crop labour requirements (CLR), available household labour (AHL) and the ratio AHL/CLR representing field size. Crop labour requirements were negatively related to market participation while available household labour and the ratio AHL/CLR for peak periods were positively related to market participation. Households firstly used their available labour to cultivate food crops for consumption while the remainder was used to cultivate cash crops (food cash crops and promoted cash crops). The understanding of these concepts has implications for the formulation of strategies to alleviate labour constraints in order to encourage smallholders to participate actively in agricultural markets.

With the use of these three concepts, the study was also able to estimate: the potential area that a household could cultivate, the areas likely to be allocated to food crops for consumption and to cash crops, and the proportion of households that could become participants in agricultural markets or that were food insecure in terms of production. The estimates from this study compared well with independently surveyed data. This research provided a basis for predicting improved market participation if available household labour was increased and crop labour requirements were reduced. However, further study would be required to obtain empirical evidence of the equations, to test and improve the accuracy of these estimates.

The study presented possible strategies to reduce crop labour requirements and increase the efficiency of available household labour based on smallholders' suggestions, experience and literature. They included: improved cultivation power, improved agricultural practices, provision of inputs, provision of credit, improvement of access roads and establishment of buying networks at the village level.

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CHAPTER 8 : ASPECTS OF PROFITABILITY INFLUENCING SMALLHOLDERS CASH CROP PREFERENCES IN NORTHERN MOZAMBIQUE

Gastão Lukanu, Maryann Green and Steve Worth

Abstract

This study analysed the relationships between different aspects of profitability, indicators and cash crop preferences. It relied on two hypotheses: (i) aspects that enhanced the profitability of cash crops would positively influence smallholders' preference for a cash crop; and (ii) indicators of profitability that incorporated more financial and non-financial aspects of profitability would correlate better with smallholders' cash crop preferences.

Cash crop preferences were related to financial and non-financial aspects of profitability. Apart from the need to promote crops with good farm gate prices, reduced production and marketing costs, promoters needed to take into account a system that included the financial and non-financial aspects that influenced profitability and household consumption requirements. The correlation between indicators of profitability improved as more financial and non-financial aspects of profitability were incorporated. The proposed average ranked profitability correlated better with cash crop preferences. This is because the average ranked profitability incorporated more aspects of profitability. This average rank also provided a better indication about the current smallholders' cash crop preferences. In addition, it reflected the support needed to improve the profitability of cash crops. This simple method of identifying smallholder preferences for cash crops was of paramount importance in the design of strategies for improving agricultural market participation.

Key words: Aspects of profitability, indicator of profitability, cash crop preferences.

8.1 Introduction

Profitability of cash crops[29] was indicated as an important factor influencing market participation[30] in southern Niassa (Lukanu *et al*, 2004). To achieve pro-poor rural growth, it was essential to address explicitly the problem of low profitability of cash crops (Heltberg and Tarp, 2002). Smallholders reacted to profitability incentives rather than price alone (Anderson, 2003). Boeteng *et al* (1987) found that smallholders in Ghana preferred to cultivate and market food cash crops than cocoa because they were more profitable. Omamo's (1998) study in Kenya concluded that farmers' choice of food cash crops that had less gross income compared to cotton was due to cotton's high transportation costs. This suggested that higher transportation costs reduced the profit of cotton compared to food cash crops; in spite of the fact that cotton's sales price was comparatively higher than that of food cash crops.

This study aimed to analyse some financial and non-financial aspects of profitability, the financial and subjective indicators of profitability and smallholder cash crop preferences. Specifically this study had the following objectives:

(i) Analysing financial and non-financial aspects of profitability that influenced smallholders' cash crop preferences;

(ii) Analysing financial and subjective indicators of profitability that best predicted smallholders cash crop preferences; and

(iii) Investigating the current and the projected smallholders' cash crop preferences based on aspects and indicators of profitability.

Selectivity statistical models could be used to identify and test constraining factors that affected market participation (Makhura, 2001; Matungul, 2002). Identification of these factors gave an idea of limitations to participation in a given cash crop and allow prediction if the magnitude of these factors were reduced. However, statistical tools could seldom be used in the field because of the skill required. Yet there was a need for quick and routine information to be collected for the design and the implementation of agricultural market development programmes.

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[29] *Cash crop in this study referred to any crop that could be sold, be it food cash crops or promoted cash crops. Food cash crops included maize, beans, cassava and promoted cash crops such as tobacco, cotton, sesame, sunflower and paprika*

[30] *Market participation here was defined as the percentage of the households selling a given cash crop.*

Governments, donors and NGOs in Northern Mozambique, were attempting to promote cash crop diversification to prevent smallholders from becoming too dependent on the few existing cash crops such as cotton and tobacco promoted by monopolistic agribusiness companies (Tickner *et al*, 2001; PAMA, 2003). However, given the limitation of household labour and subsequently the difficulty of increasing the amount of land cultivated to accommodate the new cash crops, smallholders tended to substitute new cash crops for the existing cash crops[31] if they thougtht that their profitability was better (tobacco example in Chapter 7). Otherwise, smallholders would reject newly promoted cash crops. Rejection of cash crops after investment means a waste of resources by donors, agribusiness companies, the implementing NGOs and farmers. An anticipated knowledge of smallholders' cash crop preferences would limit this waste because donors and promoters would have a prior knowledge of the likely preference for cash crops and the underlying factors determining such a preference. With this knowledge, donors and promoters could better tailor the strategies for promoting smallholder participation in agricultural markets.

8.2 Analytical Methods

8.2.1 Theoretical Background

A financially (or theoretically) profitable crop means that farmers would have a positive net income after deducting the total costs from the gross income. However, it was likely that what affected smallholders' cash crop preferences were what they expected the profitability to be, not the actual calculated financial profitability. Smallholders would form a positive attitude in relation to a cash crop if, after evaluation, they thought that the means of obtaining a good profit were in place. A positive attitude in relation to a cash crop could be defined as a learned predisposition to respond in a consistently favourable manner with respect to a cash crop (Schiffman and Kanuk, 1987). Farmers were likely to prefer, and subsequently cultivate and participate in the sale of a given cash crop to the detriment of others, when expressing their positive attitude toward the crop (for example, reporting that they especially liked the crop).

Figure 8-1 shows the financial and non-financial aspects that influenced profitability of cash crops in southern Niassa (summarised from Figure 2-1). The bottom line (shaded bar) of the

[31] *New cash crop could be a cash crop being introduced or an existing cash crop being promoted by creating better production and marketing conditions.*

figure reflects the financial aspects of profitability: "production multiplied by price minus costs is equal to profit". These financial aspects of profitability were likely to influence cash crop preference. For example, Shan and Arulpragasam (1991) suggested that low expected farm gate prices influenced market participation (a proxy for cash crop preference) negatively. According to Gladwin *et al* (2001), smallholders would opt for a non-food cash crop only if the profitability was twice or thrice the profitability from food cash crops.

The remaining factors in Figure 8-1 refer to non-financial aspects of profitability that include: (i) agro-ecological and natural resources, (ii) households socio-economic characteristics, (iii) the research, development and access to extension, (iv) policies and institutional infrastructures, (v) physical infrastructures, and (vi) access to markets. Isolated or combined effects of these non-financial aspects influenced the financial aspects of profitability, that is, the production, prices and costs, and subsequently the profit. Smallholders' perceived labour (one of the household socio-economic characteristics), extension and access to market as the most important non-financial aspects of profitability that influenced their participation in agricultural markets (Table 5-12).

Smallholders attached value not only to financial aspects of profitability but also to the means of obtaining such a higher profit (Paarlberg, 1993). That is, the financial aspects of profitability were not the only factors that motivated smallholders to prefer certain cash crops. However, rational decision-making about the actual risk factors or the non-financial aspects that influenced the likelihood of achieving the profitability would have a greater influence on smallholders. For example, Lukanu *et al* (2004) found that lack of reliable buyers was the second most important factor that negatively influenced smallholders' cultivation and market participation in southern Niassa. People would not cultivate a cash crop if the marketing system was less likely to absorb their output (Hornik, 1993). Madikezela and Groenewald (1998) reported that lack of market information negatively affected the marketing of smallholders' vegetables in Eastern Cape, South Africa.

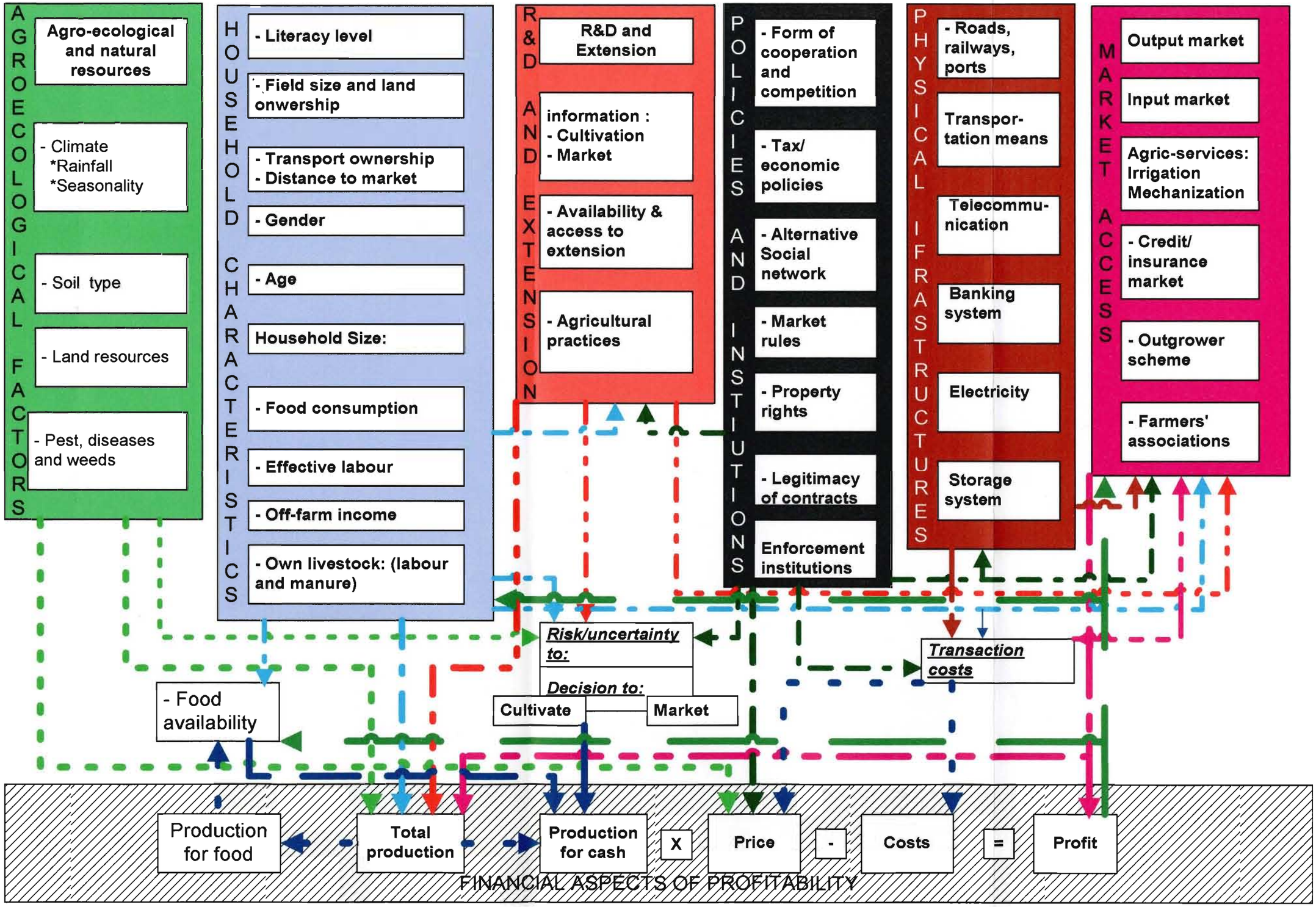

Figure 8-1. Factors and related interactions affecting smallholder participation in agricultural markets (summary from the review of literature).

The first hypothesis was that financial and non-financial aspects that influenced profitability such as farm gate price, production (crop yields times area), input costs, labour costs, reliability of prices, and access to inputs, extension services and markets would influence cash crop preferences. The second hypothesis was that the indicators of profitability that incorporated more financial and non-financial aspects of profitability would correlate better with smallholders' cash crop preferences. Apart from attempting to test the validity of the above hypotheses, the study attempted to explain current and projected cash crop preferences based on indicators of profitability for each of the cash crops promoted in southern Niassa.

8.2.2 Analytical Methods

The study used statistics to analyse and investigate the relationships between aspects of profitability, indicators of profitability and cash crop preferences. Correlation analysis between aspects of profitability and cash crop preferences was initially performed for each variable. A multiple regression analysis was performed to determine an equation that could be used to predict cash crop preference. This linear regression model was compared to the indicators of profitability discussed in this study.

8.3 Important Aspects of Southern Niassa Cropping Systems

A detailed description of the study area has been provided in Chapter 3 of this study. Farmers generated their income from crops by selling both food cash crops and promoted cash crops (Lukanu *et al*, 2004). Some agencies have been involved in promoting a number of crops. JFS Company promoted tobacco and cotton as export crops. Most NGOs such as OXFAM, "Acção Cristã Interdenominacional da Saúde" (ACRIS), "União dos Camponeses e Agricultores a Sul de Niassa" (UCASN), World Relief – SempreVerde and Government Extension Services have been involved in the promotion of sesame, sunflower, paprika, vegetable and food crops (Annexure 2).

JFS Company efficiently provided extension, inputs/credit and marketing of smallholder outputs. The company possessed a pre-processing facility for de-seeding cotton and also for packaging. The company had about 50 years of experience in southern Niassa. OXFAM/UCASN provided extension services and seed. They facilitated the buying process through farmers' associations. WR-SempreVerde was attempting to copy the JFS Company

model that covered crop market research, farmers' mobilization, production, collection and distribution of the products to the buyers in local, regional and international markets.

Southern Niassa had a population density of only 13 people/km^2 (Instituto Nacional de Estatisticas, 2001). In addition, land was a non-limiting factor (Ministério de Agricultural e Pesca, 1996). Therefore, smallholders could increase their production by increasing the size of the cultivated land. However, household labour limitations, lack of finance to pay for additional labour, unavailability of casual labour during peak periods and inadequate labour-saving strategies impeded farmers from increasing their cultivated area (Chapter 7).

Inputs such as pesticides and fertilisers to increase yield were available only through JFS Company and only for tobacco and cotton. Other crops were cultivated using local practices consisting of rotation, fallows, crop mixing or intercropping, burning, and cultivation of crops resistant to adverse conditions. The yields for the majority of these crops were low due to the poor seed quality, low planting density, lack of inputs, late weeding and poor soil management (Bias and Donovan, 2003). Poor rain patterns also negatively affected yields.

Smallholders in southern Niassa produced the majority of cash crops including tobacco, cotton, food cash crops, sesame, sunflower and paprika (author observation). JFS Company exported tobacco and cotton to regional and international markets. Export Marketing and V & M (agribusiness companies) exported sesame to international markets. NGOs facilitated the selling of sunflower seed to local buyers for the oil industry. Formal and informal traders distributed food cash crops in cities (province, districts, and administrative posts) within the Northern region of Mozambique. These agribusiness companies and Mozambican and Malawian traders also exported remaining food cash crops to Malawi (PAMA, 2003).

8.4 Methodology

8.4.1 Research techniques

More detailed information about the methodology utilised could be found in Chapter 4. Data for this study were collected in Cuamba district based on cluster sampling involving villages grouped along the key routes from the City of Cuamba to different districts of southern Niassa, Nampula and Zambezia provinces. One to two villages were selected from each route depending upon the number of villages present. This chapter used some data from the survey conducted in September 2002 using the following tools:

(i) A total of 287 usable questionnaires from nine villages: Stratified sampling taking into consideration marital and wealth status was used. This refelcted a ten percent sampling in villages with an average of 320 households each. A total of 18 interviewers, working in pairs, administered the questionnaires to household heads. The questionnaire covered specific cropping information, reasons for adoption, rejection or discontinuation of crop cultivation, ranking of crops in terms of profitability, the ideal cash crops and respective income, advice for improvement of agricultural market development activities for promoters in southern Niassa.

(ii) Interviews with individual staff from relevant crop promoting institutions. This reflected managerial views about the factors influencing adoption, rejection and discontinuation of the cash crops they promoted. The managers also provided information about yield, farm gate price, inputs supplied and their respective prices and the average area cultivated by smallholders for the cash crops that they promoted.

8.4.2 Data Collected

Table 8-1 presents the data used in this study and explains how they are estimated from the information smallholders and promoters provided for each of the cash crops. Most data were converted to rankings for the sake of simplicity. Rankings of zero to five were used for the six cash crops being analysed: food cash crops, tobacco, cotton, sesame, sunflower and paprika[32]. Ranking was easy enough for development officers to assess. In addition, transforming all the aspects of profitability to rankings helped to compare different aspects of profitability for different crops (for example, one aspect was better for this crop than for another) and different aspects of profitability in a cash crop (for example, a given cash crop was weaker in relation to a given aspect of profitability).

Profitability of cash crops in the smallholder context was expressed in US$/household. Many authors assessed profitability of cash crops in US$/Household (Nji and Sama , 1987; Cairns and Lea, 1990; Makhura, 2001 and Matungul, 2002, Jayne *et al*, 2003). The estimated average areas that a household could cultivate for southern Niassa cash crops were 1.1 ha for food cash crop, 0.4 ha for tobacco, 0.9 ha for cotton, 2.7 ha for sunflower, 2

[32] *The range of ranks depended on the number of cash crops available for possible cultivation and market participation from which smallholders could select.*

ha for sesame and 1.3 ha for paprika[33]. Except for sunflower and sesame (that were not tested because of lack of data), the coefficient (0.979) and slope (1.162) suggested a good estimate. Therefore, the study used these areas to compare the amount of income (in US$) a household could get (or use to pay for labour and inputs) if it cultivated each of the cash crops discussed in this study. The amount of income a household could obtain from selling cash crops (US$/household) reflected many household and farming system aspects, such as:

(i) The available household labour. The higher the available household labour, the greater the area a household could cultivate, the greater the production and the greater would be the income from a cash crop (Chapter 7);

(ii) The crop labour requirements of the cash crop. A higher crop labour requirements could limit the area to be cultivated, which would result in lower production and lower income from cash crops (Chapter 7);

(iii) Crop labour requirements of food crops. The higher the food crop labour requirements, the more available household labour would be assigned to food crop for consumption (this was a priority in southern Niassa, see Chapter 3) and subsequently less area would be assigned to a cash crop. This would result in a smaller area being cultivated for cash crops and subsequently less income from agricultural markets (Chapter 7);

(iv) The consumption requirements of the households which incorporated factors such as household composition. The higher the consumption requirements (mainly due to a larger numbers of dependents), the greater the area required to cultivate food crop for consumption, the smaller the area that could be assigned to cash crops, and subsequently the lower production and lower income from agricultural sales (Goetz, 1992; Chapter 7).

(v) Yield of cash crops and food crops for consumption (yield incorporates aspects such as area, soils, inputs, variety and agricultural practices). Increased yield of food crop for consumption and cash crops enhanced the amount of income that a household could make from sale of a cash crop.

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[33] *Estimates matched the measured data for food crops, tobacco and cotton (Chapter 7). Sesame and sunflower were not cultivated as the main crops as they were often mixed with maize. This suggested that a proper estimate of the area cultivated for sesame was needed. It was also assumed that smallholders cultivated only one cash crop. However, data suggested that they cultivated about 1.8 cash crops per household.*

Table 8-1. Data used in this study and how they were assessed (ranks used: 0 = lowest rank and 5 = highest rank).

Data	How estimated
Farm gate price and rank	Price for each of the crops during the 2001/2002 survey. A highly priced crop received a rank of five while the lowest price crop received a rank of zero.
Yield and rank	Average yield obtained in southern Niassa for each of the cash crops. A highest yield received a rank of five while the lowest yield received a rank of zero.
Area of cultivated field	Area estimated based on available household labour, crop labour requirements during the peak period and household consumption requirements (Chapter 7).
Cost of inputs and rank	The cost of inputs based on information from farmers, cash crop promoter institutions and government agricultural department. Highest input costs received rank of zero while lowest one received a rank of five.
Cost of labour	The estimated cost of labour based on crop labour requirements in person-days multiplied by 1.1 US$ per day of work, the minimum wage in Mozambique for formal employment. Crop with highest labour costs received a rank of zero while the lowest one received a rank of five.
Crop labour requirements	Assessed based on farmers' information about labour for each of the agricultural operations of a crop (more detail in Chapter 7).
Ranked reliability of price	Assessed based on a crop that had reliable price, a price that was less likely to decrease from the prices promised by the promoters. The crop with the least reliable price received a rank of zero while the crop with the most reliable price received a rank of five.
Rank of access to input	Crops were classified in terms of access to inputs based on the percentage of farmers that indicated a lack of inputs as cause of non-cultivation and marketing of the crop (Table 5-12). Crops with highest percentages of farmers not cultivating due to lack of inputs received a rank of zero while those with a lowest percentage of farmers received a rank of five, indicating lower access and higher access to inputs, respectively.
Rank of access to extension and experience	Crops were classified in terms of access to extension/experience based on the percentage of farmers that indicated lack of extension/experience as a cause of non-cultivation (Table 5-12). Crops with higher percentage of farmers not cultivating due to lack of extension/experience received a rank of zero while those with a lower percentage received a rank of five, indicating lower access and higher access to extension/experience, respectively.
Rank of access to reliable buyer	Assessed based on cash crops in terms of reliability of buyers, five being the crop with the most reliable buyers and zero the least.
Ranked profitability	Assessed based on farmers' responses when asked to rank the six cash crops in terms of profitability, five being the highest ranking and zero the lowest.
Perceived relative advantage	Assessed based on farmers' responses when asked to rank the six cash crops in terms of general benefits, five being the most advantageous cash crops and zero the least. Or this is the degree to which smallholders perceive a cash crop as better than another taking into consideration (in their mind) various important factors of the farming system (Rogers, 1962).
Desired income from cash crops	Assessed by asking farmers to indicate how much they would like to generate with the sale of one of their best (ideal or hypothetical) cash crop.
Cash crop preference	Crops were classified in terms of assumed preference based on the percentage of farmers that marketed that crop (Table 5-10). Crops with a highest percentage of farmers received a preference rank of five while those with the lowest percentage received a preference rank of zero, indicating higher and lower preference by smallholders, respectively.

8.5 Results and Discussion

This section provides the results and discussion about financial and non-financial aspects of profitability and indicators of profitability. The results and discussions also employed a linear regression model for predicting cash crop preference. The study applied the indicators of profitability, the regression model and respective explanatory variables to interpret current and projected cash crop preferences. Apart from attempting to validate the hypotheses underlying this research, the study also developed a simple tool that used ranking and simple addition/division operations to predict cash crop preferences. The statistics between real numbers and ranks were similar for most important aspects of profitability such as price, yield, reliability of the price and access to extension. The study used ranks because these were simple to use and they facilitated the standardisation of data for possible comparison. Statistics are presented in the discussion.

8.5.1 Financial Aspects of Profitability Influencing Cash Crop Preferences

Analysis of different financial aspects of profitability could provide an indication of cash crop preferences. Financial aspects of profitability discussed in this study included ranked farm gate price (the value of money per kilogram of product paid to smallholders at certain selling points at the village level), ranked yield, and ranked input and labour costs. The area of cultivated fields was not discussed here because many other researchers have covered this. Nji and Sama (1987), Fenwick and Lyne (1999) and Matungul (2002) reported that the size of the cultivated field correlated positively with smallholder participation in agricultural markets and with adoption of crops. This is because smallholders with larger areas had greater production and subsequently greater volume for marketing. In addition, fixed transaction costs declined per unit increase in production.

A. Price and Yield

It was expected that, other factors being held constant, farmers would get involved in markets for those cash crops with a higher farm gate price. In the present study, the ranked farm gate price correlated positively but insignificantly with cash crop preferences ($R = 0.257$; $\alpha = 0.311$) (Table 8-2). Focus group discussions revealed that the future promised and/or present farm gate price had an immediate response in farmers' cash crop preferences. Nevertheless, the positive reaction due to the higher prices had a short-term effect. Smallholders did not prefer a cash crop with a high farm gate price if they had experienced high risks due to crop labour requirements, reduced yields, unreliable price, lack of extension, lack of inputs or lack of reliable buyers for that crop.

Table 8-2. The average calculated sale, related aspects and cash crop preferences in Cuamba (n = 6, Cuamba, September 2002).

	CASH CROP PREFERENCES		PRICE/KG		POTENTIAL AREA	YIELD		SALE/ HOUSE-HOLD
	%[1]	*RANK*	US$/ KG	*RANK*	HA	KG/HA	*RANK*	US$/HH
PAPRIKA	1	*0*	0.50	*4*	1.3	500	*0*	325
SUNFLOWER	5	*1*	0.10	*0*	2.7	600	*2*	162
SESAME	7	*2*	0.13	*2*	2.0	600	*1*	156
COTTON	23	*3*	0.15	*3*	0.9	771	*3*	104
FOOD CROPS	38	*4*	0.13	*1*	1.1	1175	*4*	162
TOBACCO	40	*5*	0.75	*5*	0.4	1200	*5*	360
Pearson R				0.257			0.943	
Significance (α)				0.311			0.002	
R square				0.066			0.889	

Ranked yield had a positive effect on cash crop preferences by smallholders. The correlation between ranked yield and cash crop preferences was positive and significant (R = 0.943; α = 0.002). Stepwise regression involving all the profitability-related aspects as independent variables and cash crop preferences as the dependent variables suggested that ranked yields was the single most important factor that best explained the variation on cash crop preferences (Table 8-3; Annexure 10). It explained 86 percent of the variation in cash crop preferences. Nevertheless, the yield of a cash crop incorporated the effect of good extension (R = 0.771) and access to inputs (R = 0.657) in a package deal provided by JFS Company for tobacco and cotton and by NGOs for food cash crops, sesame, sunflower and paprika.

Table 8-3. Stepwise regression between cash crop preferences and profitability related aspects in Cuamba (n = 6, Cuamba, September 2002).

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
.943(a)	.889	.861	.697	.889	32.029	1	4	.005	2.754

	Unstandardised Coefficients		Standardised Coefficients			95% Confidence Interval for B		Correlations			Co-linearity Statistics	
	B	Std. Error	(Beta)	T	Sig.	Lower Bound	Upper Bound	Zero order	Partial	Part	Tolerance	VIF
(Constant)	.143	.504		0.283	.791	-1.258	1.543					
YIELRANK	.943	.167	.943(a)	5.659	.005	.480	1.405	.943	.943	.943	1.000	1.000
PRICRANK			.125(b)	0.693	.538				.371		.980	1.021
INPURANK			.183(b)	1.125	.343				.545		.980	1.021
LABORANK			.053(b)	0.276	.800				.157		.993	1.007
PRRERANK			.250(b)	0.941	.416				.477		.405	2.470
ACCINPUT			-.034(b)	-0.136	.901				-.078		.568	1.760
ACCEXTEX			.250(b)	0.941	.416				.477		.405	2.470
ACCBUYER			.091(b)	0.454	.681				.253		.862	1.160

a Predictors in the Model: (Constant), YIELRANK (ranked yield)

b Others: PRICRANK (ranked price), INPURANK (ranked inputs costs), LABORANK (ranked labour costs), PRRERANK (ranked reliability of the price), ACCINPUT (ranked access to inputs), ACCEXTEX (Ranked access to extension and experience) and ACCBUYER (ranked access to reliable buyers).

B. Inputs and Labour Costs

The study assumed an insignificant yearly cost for implements because implements could be used for more areas of land and for many years. This could be supported based on information reported for southern Niassa where traders had difficulties selling implements due to poor demand (PAMA, 2003). Overall the ranked input costs ($R = 0.147$; $\alpha = 0.394$) and ranked labour costs ($R = 0.486$; $\alpha = 0.164$) did not have any significant relationship with cash crop preferences (Table 8-4). Nevertheless, the correlation confirmed that smallholders preferred cash crops with reduced cost for input and labour.

Farmers did not quantify the cost of seeds for food cash crops (maize and other crops intercropped with it; see Table 5-10 for intercropped crops), as seeds were part of their own stock. They also did not quantify the cottonseed costs. JFS Company subsidised cottonseed. After deseeding the cotton, the company dumped the seeds at the village chief's compound for collection by any interested producers.

Table 8-4. Cost related aspects of profitability and cash crop preferences in Cuamba (n = 6, Cuamba, September 2002).

	CASH CROP PREFERENCES		INPUT COSTS/HOUSEHOLD			LABOUR COSTS/HOUSEHOLD			TOTAL COSTS/HOUSE-HOLD	
	%	Rank	US$ /HH	Costs/ Sales (%)	Rank	US$ /HH	Cost/ Sales (%)	Rank	US$/HH	Costs/ Sales (%)
PAPRIKA	1	*0*	25	8	2	339	104	4	364	112
SUNFLOWER	5	*1*	22	14	0	181	112	2	203	125
SESAME	7	*2*	12	8	3	164	105	3	176	113
COTTON	23	*3*	5	5	4	243	233	0	248	238
FOOD CROPS	38	*4*	0	0	5	262	162	1	262	162
TOBACCO	40	*5*	42	12	1	159	44	5	201	56
Pearson R					0.147			0.486		
Significance (α)					0.394			0.164		
R square					0.022			0.236		

The cost of labour was rarely quantified as this was mostly the contribution of household members. The low significance of the relationship between labour costs and cash crop preferences also showed that smallholders did not take labour costs as the most important factor when deciding to cultivate a cash crop. Nevertheless, one needs to take labour and total costs into consideration when a household hired labour for fieldwork. Overall, the cost of production of tobacco was about 56 percent of the total sales. It is likely that the proportion of farmers cultivating and participating in the tobacco market would continue to increase, partly because they could use the income from tobacco sales to pay attractive wages to hired labour. Hiring of labourers was less feasible with other crops that had the risk of losses when paying for labour.

8.5.2 Non-financial Aspects of Profitability Influencing Cash Crop Preferences

The non-financial aspects of profitability included the ranked reliability of price (8.6.2.1), the ranked access to inputs (8.6.2.2), the ranked access to extension & experience (8.6.2.3) and the ranked access to reliable buyers (8.6.2.4). These aspects referred to the conditions that needed to exist to help smallholders believe that they could realise a good profit (by minimising risks) and therefore decide about cultivating a given cash crop.

A. Reliability of Price

The ranked reliability of price was positively and significantly related to cash crop preferences ($R = 0.829$; $\alpha = 0.021$). This rank represented smallholders' perception about the possibility of getting the same or a higher price than the promised one (Table 8-5). That is, apart from setting a higher price, smallholders wanted to be assured that the price would not

come down when selling their products. Farmers distrusted buyers that decreased the price in relation to the promised one, or buyers that downscaled and/or downgraded the quality of their products in order to pay lower overall prices (Table 5-15). Smallholders (42%) pointed out that buyers needed to be reliable in terms of the prices when asked to suggest what advice should be given to promoters.

The ranked reliability of prices was positively and significantly related to ranked yields ($r = 0.771$, $\alpha = 0.036$) and ranked access to inputs ($r = 0.771$, $\alpha = 0.036$). It was also highly (but not significantly) related to ranked farm gate price ($r = 0.600$; $\alpha = 0.104$), ranked access to extension/experience ($r = 0.657$; $\alpha = 0.078$) and access to reliable buyers ($R = 0.600$; $\alpha = 0.104$). That is, the reliability of the price for a given cash crop would be high for high yielding crops and/or those crops with access to inputs, access to extension/experience and access to reliable buyers. Farmers seemed to believe a promoter's information about price if the promoter was also taking risks by investing its resources to provide inputs/credit, provide extension and ensure buying of the crops it was promoting.

Table 8-5. Non-financial aspects of profitability and cash crop preferences in Cuamba ($n = 6$).

	CASH CROP PREFER-ENCE		RELIA-BILITY OF PRICE	ACCESS TO INPUTS		ACCESS TO EXTENSION/EXPERIENCE :				ACCESS TO RELIABLE BUYERS	
	%	Rank	Rank	Lack (%)	*Rank*	Lack of extension (%)	Lack of experience (%)	Total (%)	Rank	%	Rank
PAPRIKA	1	*0*	*2*	13	*2*	5	45	50	*0*	2	*3*
SUNFLOWER	5	*1*	*0*	26	*1*	3	8	11	*1*	9	*1*
SESAME	7	*2*	*1*	30	*0*	4	4	8	*2*	6	*2*
COTTON	23	*3*	*3*	1	*4*	3	0	3	*4*	19	*0*
FOOD CROPS	38	*4*	*4*	0	*5*	0	0	0	*5*	0	*5*
TOBACCO	40	*5*	*5*	1	*3*	5	0	5	*3*	1	*4*
Pearson R			0.829		0.600				0.829		0.429
Significance (α)			0.021		0.104				0.021		0.198
R square			0.687		0.360				0.687		0.184

B. Access to Inputs

Production may be increased by increasing the cultivated area or by increasing yield (intensification) (Larson and Frisvold, 1996). Smallholders were too short of labour to increase the size of the cultivated land (Chapter 7). Smallholders could obtain a stable yield based on traditional practices such as timely sowing, weeding and harvesting, and use of

drought-, disease-, pest- and weed-resistant crops. However, quality seed, fertilisers and pesticides were needed for an immediate increase in yield.

The correlation between the ranked access to inputs and cash crop preferences was positive, high but not significant ($R = 0.600$; $\alpha = 0.104$) (Table 8-5). Inaccessibility of inputs, mainly in the form of seed, was an important factor affecting non-cultivation of sesame (30%), sunflower (26%) and paprika (13%) (Table 5-12). ACRIS, WR-SempreVerde and OXFAM/UCASN introduced paprika into the southern Niassa cropping system. However, the majority of the farmers were not aware of paprika and of extension services that provided seed support because of limited coverage by these NGOs. Similarly, the NGOs that promoted sesame and sunflower reached only a few selected villages.

The accessibility to inputs by itself implied a change in the environment that had reinforced existing practices. Therefore, farmers would make their decisions to adopt cash crops according to new criteria and would value different crops that had accessible inputs (Hornik, 1993). In fact, smallholders pointed to the need for inputs (61% for implements and 53% for agrochemicals inputs) when suggesting the support they needed to improve their participation in agricultural markets (Table 5-14).

C. Access to Extension and Experience

Overall, a small percentage (< 5%) of respondents indicated a lack of extension as a factor preventing them from cultivating and marketing cash crops (Table 8-5). However, the percentage of respondents that did not cultivate due to lack of experience was large for paprika (45%), followed by sunflower (8%) and sesame (6%). No farmers reported lack of experience as a problem for cotton and food crops because of the number of years that they had been cultivating these crops (Table 8-5). The study analysed extension and experience together because provision of extension could help transfer knowledge, skills and practices required to overcome the lack of experience. That is, farmers would report lack of experience for those cash crops that had weaker extension support. Overall, the correlation between the ranked access to extension (including experience) and cash crop preferences was positive and significant ($R = 0.829$, $\alpha = 0.021$).

The ranked access to extension and experience also related positively and significantly with ranked yield ($R = 0.771$, $\alpha = 0.036$) and with ranked access to inputs ($R = 0.771$, $\alpha = 0.036$). There was a relationship between extension/experience and access to inputs because farmers

who had access to extension (from JFS Company or NGOs) often had concomitant access to inputs whether by direct buying or through credit from JFS Company or subsidised inputs from NGOs. In addition, the correlation of the ranked access to extension/experience and other factors such as the ranked inputs costs ($R = 0.657$, $\alpha = 0.078$) and ranked reliability of the price ($R = 0.657$, $\alpha = 0.078$) was high although not significant. In practical terms, the analysis suggested that access to proper extension support was a key to the improvement of yield, facilitation of accessibility of inputs, and provision of more reliable information about prices and buyers.

The FGDs also revealed that the majority of households that adopted and continued with the cultivation of cash crops had always been able to obtain good yields because of their contact with extension workers. The importance of an effective extension service in overcoming the lack of experience could be observed with tobacco introduction in southern Niassa. Tobacco was a newer cash crop compared to sesame and sunflower. However, no farmers indicated lack of extension/experience as factors contributing to tobacco non-cultivation compared to sesame (8.4%) and sunflower (11%) (Table 8-5). Good extension networks and services by JFS Company reached, in less than four years, 40% of respondents cultivating tobacco.

D. Access to Reliable Markets

Reliability of the market/buyers ensured that smallholders sold their products and realised the profits. The ranking of access to buyers was positively but not significantly related to cash crop preferences ($R = 0.429$; $\alpha = 0.198$). However, smallholders quoted the need for reliable buyers (20%) when when suggesting advice to promoters that would improve agricultural market development activities in their villages (Table 5-15). Table 5-13 also shows the importance of reliable buyers as a factor influencing smallholders' participation in the agricultural market.

The ranked access to reliable buyers was low for cotton in spite of the fact that JFS Company rarely failed to buy cotton[34]. In addition, tobacco and cotton had the same buyers (JFS Company) but more than 19 percent of farmers that did not cultivate cotton alleged unreliability of the buyer as a reason compared to only one percent for tobacco (Table 8-5). JFS Company used its resources to ensure that tobacco buying commenced in

34 JFS was a 50 year old company with a cotton ginning industry in Cuamba. This suggested that, the company had the obligation to buy cotton as raw material to keep up its productivity and be able to pay the costs and make a profit (see Chapter 3).

February/March to avoid side-selling. However, the company bought cotton very late starting from August/September. In addition, tobacco had fixed buying points where farmers could go when they had enough quantity while cotton had fixed day/s and at a fixed place, when and where farmers had to sell their cotton. Failure to sell the cotton on that day and place meant farmers had to transport it to another selling place. Farmers often anticipated the transportation and accumulation of cotton at the selling place and waited for the buyers. JFS Company's failure to come on the promised day caused frustration, rejection and discontinuation for cotton by smallholders. That is, although cotton and tobacco had the same buyer, the market for tobacco was more reliable and organised than the market for cotton. Therefore, other factors being held constant, farmers would prefer to cultivate tobacco than cotton.

E. Summary of Aspects of Profitability

Figure 8-2 and Figure 8-3 (relating individual aspects of profitability with an ideal predictor of cash crop preferences) suggested that ranked yield, followed by ranked reliability of price and ranked access to extension & experience were closely related to smallholder preference for a cash crop. Ranked yield was the single most important profitability aspect that explained more than 86 percent of the variation on cash crop preferences. Yield was positively related to use of inputs and extension recommendations. Therefore, the link between the provision of extension and inputs to increase the yield of cash crops would positively influence smallholders' cash crop preference. In addition, smallholders would consider farm gate prices as reliable if the promoter provided extension and inputs, and ensured the buying of the products. Other factors that positively influenced cash crop preferences included, in order of importance, the ranked access to inputs, ranked access to buyers, ranked labour costs and ranked farm gate price. The above findings were in line with farmers' perception of factors influencing smallholders' market participation discussed in Chapter (5.5.1). Based on smallholders' information, it was also concluded that an agricultural development project composed of extension support, input package, profitable crop, reliable buyer, and provision of information about prices, yields and buyers was likely to influence positively smallholder participation in agricultural markets.

The study suggested that promoters needed to promote cash crops with higher yields, crops with reliable and higher prices, and crops that had extension support. In addition, promoters needed to facilitate the supply of inputs that would allow farmers to increase yields.

Promoters needed also to ensure markets for outputs were in place. Further, the crops should be profitable enough to pay for inputs and labour costs.

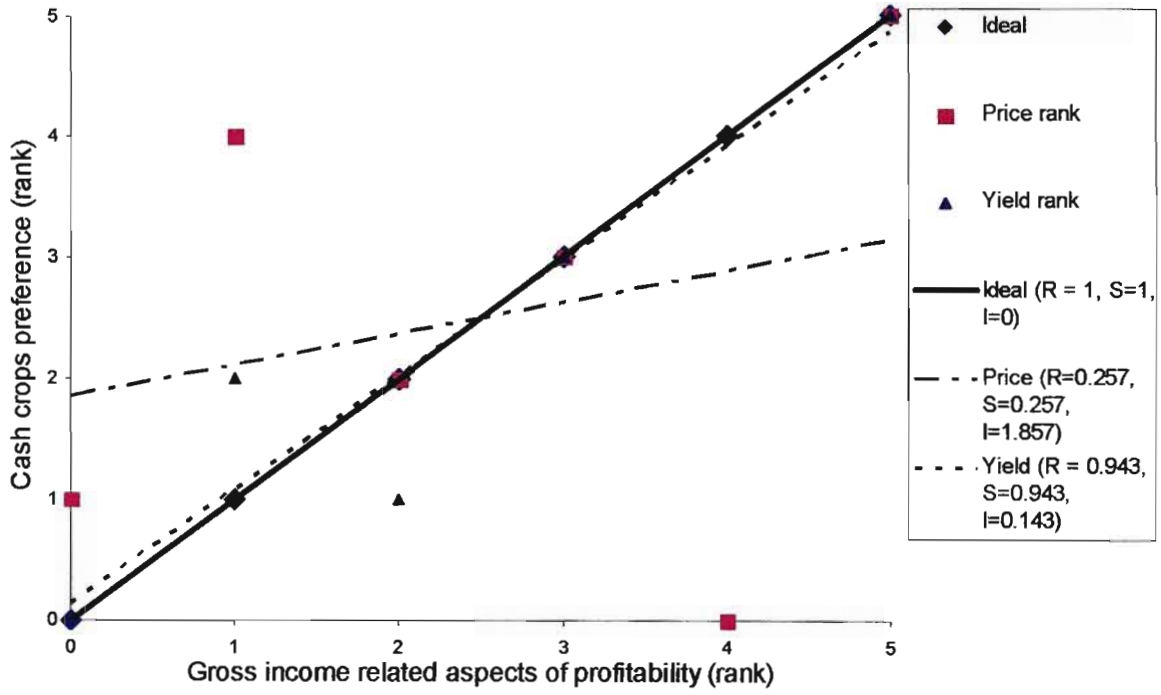

Figure 8-2. Trendlines for financially related aspects and cash crop preferences (5 = tobacco, 4 = food crop, 3 = cotton, 2 = sesame, 1 = sunflower, 0 =paprika)

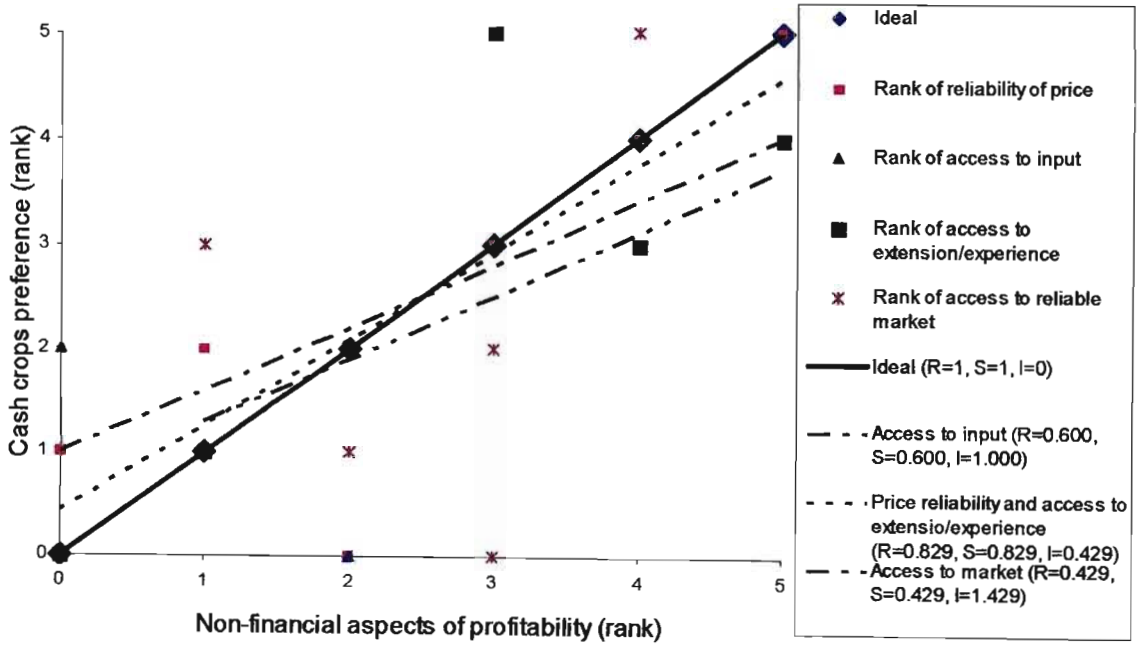

Figure 8-3.Trend lines for non-financial related aspects of profitability and cash crop preferences in Cuamba (n = 6). (5 = tobacco, 4 = food crop, 3 = cotton, 2 = sesame, 1 = sunflower, 0 =paprika)

8.5.3 Indicators of Profitability

Indicators of profitability were estimated by (i) identifying the various financial and non-financial aspects of profitability, and (ii) using a calculation or a mental process to estimate whether a crop was profitable or not. The hypothesis of this study was that the more financial and non-financial aspects of profitability incorporated in the indicator of profitability, the better it would predict the cash crop preferences. The importance of this study was also to identify simple and quickly determinable indicator/s of profitability that best predicted cash crop preferences.

The following indicators were analysed:

(i) Profit1 that took into consideration total sales and total costs (including labour);
(ii) Profit2 that took into consideration only gross total sales and input costs;
(iii) The Profit2 ratio between promoted cash crops and food cash crops;
(iv) Ranked profitability of cash crops by smallholders;
(v) The perceived relative advantage of a cash crop (the degree to which smallholders perceived the benefit of a cash crop as better than another); and
(vi) The average ranked aspects of profitability.

The first three indicators were the financial indicators of profitability while the remaining ones represented the subjective indicators of profitability. The multiple regression model using statistically selected factors was also used to determine cash crop preference.

A. Profit1

There was a positive but not a significant correlation ($R = 0.355$; $\alpha = 0.245$) between Profit1 (net income) and cash crop preferences (Table 8-6). This financial indicator of profitability incorporated four aspects of profitability: price, production, input costs and labour costs. Farmers therefore took other factors (reported in Table 5-12 and Table 5-13) into consideration when determining their preference for a certain cash crop. In addition, tobacco (US$159/household) was the only profitable cash crop if Profit1 was taken into consideration. Smallholders would have experienced losses with other crops (-US$20/household for sesame, -US$39/household for paprika, -US$41/household for sunflower, -US$100/household for food cash crops and -US$144/household for cotton) if labour costs were taken into consideration.

B. Profit2

Profit2 (gross margin) was estimated by subtracting the input costs from the total sales. Smallholders did not consider labour costs because household members were involved in the cultivation process. Smallholders considered profit as the money paid to them after deducting the cost of inputs (pesticides and fertilisers). As expected, the relationship between Profit2 and cash crop preferences was weaker ($R = 0.065$; $\alpha = 0.452$) than the one estimated above with Profit1 (Table 8-6). This is because Profit2 only incorporated three aspects of profitability: price, production and inputs costs. Tobacco continued (US$318/household) to be the most profitable cash crop.

The smallholders' average desired income was US$354/household while the estimated average income from agricultural activities was US$182/household. This average income was within the reported household agricultural income range of US$56/household to US$216/household for the region (Davies, 1997; MAP/MSU Research Team, 1997; PAMA, 2003). This suggested that none of the southern Niassa cash crops would help smallholders to obtain their desired average income from agricultural markets. The estimated Profit2 was also far below the annual minimum wage (US$401.5/worker annum or 1.1US$/day) for Mozambique in 2003. This small income in relation to the desired household income or minimum wage constituted a disincentive for smallholders to participate in agricultural markets. It was important to help smallholders increase profits above their desired income or the country's minimum wage in order to stimulate efficient participation in agricultural markets.

So neither Profit1 nor Profit2 were significant predictors of cash crop preferences. This is because they did not incorporate any of the non-financial aspects of profitability that farmers took into consideration when deciding about cultivating a specific cash crop.

Table 8-6. Indicator of profitability and cash crop preferences in Cuamba (n = 6).

	CASH CROP PREFERENCE		PROFIT1/ HOUSE-HOLD	PROFIT2/ HOUSE-HOLD	PROFIT2/ PROFIT2 FOOD CASH CROPS	CROP LABOUR REQUIRE MENT	RANKED PROFIT-ABILITY	PERCEIVED RELATIVE ADVANT-AGE	AVERAGE RANKING	REGRESSION MODEL
	%	*Rank*	US$	US$		PERSON-DAY	Rank	Rank	Rank	
PAPRIKA	1	*0*	-39	300	1.9	307	3.9	3.2	1.5	0
SUNFLOWER	5	*1*	-41	140	0.9	164	1.3	1.1	1.3	1
SESAME	7	*2*	-20	144	0.9	146	2.8	2.3	1.9	2
COTTON	23	*3*	-144	99	0.6	220	2.8	3.0	2.9	3
FOOD CROPS	38	*4*	-100	162	1.0	237	3.4	4.4	3.8	4
TOBACCO	40	*5*	159	318	2.0	145	5.0	4.8	3.8	5
r			0.355	0.065	0.064		0.508	0.732	0.947	1.000
SIGNIFICANCE (α)			0.245	0.452	0.468		0.152	0.049	0.002	0.000
R^2			0.125	0.004	0.004		0.258	0.535	0.896	1.000

[1] ***Profit1*** *was estimated as the difference between total sales and total costs.*

[2] ***Profit2*** *was estimated as the difference between gross income and inputs costs. This was what households considered to be profit; the money they were paid.*

C. Profit2 Ratio between Promoted Cash Crops and Food Cash Crops

The R values of 0.064 and significance α of 0.468 suggested that the ratio was not a good indicator of cash crop preference. However, the hypothesis being tested suggested that farmers would only opt for a promoted cash crop if its Profit2 (the money they received after deducting input costs) was equal or more than twice the Profit2 of food cash crops. As observed by Gladwin *et al* (2001) for Malawi, the hypothesis seemed to hold in this study because only tobacco with a Profit2 twice that of food cash crops had more smallholders participating in its market (40%) than food cash crops (38%) (Table 8-6). The Profit2 for other crops were less than twice the Profit2 for food cash crops and none of these crops was preferred above the food cash crops. This financial indicator of profitability (ratio of Profit2) could better predict the likelihood of promoted cash crops being preferred above the food cash crops.

The above finding could be supported by comparing data between tobacco and food cash crops between 2000/2001 and 2001/2002. In the 2000/2001 agricultural campaign, when JFS Company was in an early stage of introducing tobacco in southern Niassa, more than 63 percent of the respondents sold food cash crops while only 21 percent sold tobacco (Lukanu *et al*, 2004). In the following agricultural season, with increased awareness and knowledge about the high profitability of tobacco, the total percentage of respondents participating in the marketing of food cash crops dropped to 38 percent while that of tobacco increased to 40 percent mainly because, according to the smallholders, of the high profit of tobacco.

This tendency of participating in the market of highly profitable promoted cash crops to the detriment of food cash crops has implications for food security. This is because smallholders supplied the majority of food cash crops in the marketing system in southern Niassa. In the first scenario, a household could use its resources firstly to cultivate food crop for consumption while it used the remainder to cultivate a highly profitable promoted cash crop. This situation would bring food shortages to the region (but not at the producer level) because of a reduced supply of food cash crops into the marketing system. This shortage would increase the price of food cash crops and could induce situation of food insecurity.

The second scenario consisted of the household cultivating just the highly profitable promoted cash crop and expecting to buy the bulk of food for household consumption. This action could cause food crop shortages at both the producer and regional levels. Food

shortages in the local market could drive up prices. The profit from cash crop may end-up not being enough to buy the required food for household consumption. Households may also aggravate the food situation because of poor saving ability of income received from selling cash crops. Tobacco was termed a famine crop in southern Niassa because of bad experiences of farmers, mainly in Mandimba District during 1999-2001. These farmers used the majority of their resources to cultivate tobacco and then failed to meet their households' needs because of poor saving strategies (author observation). Preference for tobacco cultivation due to its high profitability over surplus food was also assumed to cause food shortages in Malawi (Tickner *et al*, 2001).

The third scenario was related to the cultivation of food crops only. Farmers reported that such an option contributed to food insecurity. Poor yields, low prices in bad marketing years and pressure to sell the food reserves in response to pressing cash needs affected negatively the food security situation of the household cultivating only food crops.

Information in Table 8-7 suggested that by cultivating tobacco and paprika for marketing instead of food cash crops, farmers would improve their income by 97 percent and 86 percent, respectively (if Profit2 was taken into consideration). However, by cultivating cotton for marketing instead of food cash crops, farmers could be losing 39 percent of income that they would have attained if they cultivated and marketed only food cash crops. MDA/MSU Research Team (1996) also found that low input cotton production had a negative effect on income and the season's cereal reserve among smallholders in Nampula. Farmers' preferences for cultivating cotton was more related to market and income guarantees. Farmers preferred cotton because JFS Company guaranteed the buying and payment for cotton as opposed to food cash crops whose market could be disrupted because of possible excess supply in northern Mozambique and Malawi. Income from sesame and sunflower could be considered as an addition to food cash crops because these two crops were less likely to compete with food crops. They were sown in January-February when most food crop activities had been performed and they could be mixed or intercropped with maize.

Table 8-7. Change in income due to substitution of food cash crops with promoted cash crops in Cuamba (Cuamba, September 2002).

	Tobacco	Food cash crops	Cotton	Paprika
Profit2	318	162	99	300
Change (%)	97	0	-39	86

The study suggested that there was also a need to use the right strategies such as good price, inputs support, credit availability and reliable buyers to increase the profitability of food cash crops. These incentives would increase the percentage of smallholders cultivating and marketing food cash crops and thus preventing food insecurity at the household and regional level. In addition, to help smallholders ensure food security through promoted cash crops one needed to promote highly profitable cash crops; or promote cash crops that did not interfere with the cultivation of food crops because they could be mixed or intercropped with food crops. Crop mixing or intercropping was part of the farming system in southern Niassa. Further, cash crop promoters had the moral responsibility to ensure that their activities did not cause a food insecurity situation for smallholders and other people in the region.

D. Farmers' Ranked Profitability

Farmers' ranked profitability was a subjective indicator of profitability because it depended on smallholders' perceptions. Smallholders ranked tobacco (5) as the most profitable crop, followed by paprika (3.9), food cash crops (3.4), sesame and cotton (2.8) and sunflower (1.3) (Table 8-6). The correlation coefficient between the ranked profitability and cash crop preferences was positive but not significant ($R = 0.508$; $\alpha = 0.152$). Nevertheless, this correlation was better than any other discussed above. This may be so because farmers took into consideration many aspects when ranking crops based on profitability. In addition to price, yield, input costs, labour costs and labour requirements, farmers indicated that they opted for tobacco because: (i) the price was reliable (equal or higher than the promised price); (ii) there was a demand from the buyers; (iii) it assured money; and (iv) they knew what the profit would be. This finding further confirmed that indicators that incorporated more aspects of profitability were likely to better correlate with the percentage of farmers participating in agricultural markets.

E. Perceived Relative Advantage of cash crops

Perceived relative advantage was the degree to which smallholders perceived a cash crop as better than another (Rogers, 1962). This indicator was considered as a subjective indicator of profitability in this study because it was based on smallholder perceptions. Again, tobacco (4.8) was ranked as the most advantageous cash crop, followed by food cash crops (4.4), paprika (3.2), cotton (3), sesame (2.3) and sunflower (1.1). The correlation coefficient between farmers' perceived relative advantage of a cash crop and cash crop preferences was positive and significant ($R = 0.732$; $\alpha = 0.049$) (Table 8-6). That is, the greater the perceived relative advantage of a cash crop, the more farmers would prefer to cultivate it. Smallholders took many more aspects of a cash crop than just financial aspects of profitability into consideration when they decided on the most advantageous cash crops (Table 5-12 to Table 5-15). Unlike the ranked profitability, food cash crops were highly ranked in terms of their perceived relative advantage because they provided for both income and food and it was easy to cultivate food crops because of experience. In addition, tobacco was ranked highly in terms of its relative advantage because of its high profit (high price, high yield and low cost as related to its gross income), reliability of prices, access to extension and inputs, and access to reliable buyers. It could be concluded that indicators of profitability that incorporated more financial and non-financial aspects of profitability correlated better with cash crop preferences than those indicators that incorporated fewer aspects of profitability.

F. Average Ranked Profitability and Cash Crop Preferences

The average estimated ranked profitability was calculated by averaging the ranked financial and non-financial aspects of profitability discussed in 8.6.1 and 8.6.2: ranks of price, yield, input costs, labour costs, reliability of the price, access to inputs, access to extension and experience, and access to market. There was a highly positive and very significant correlation ($R = 0.950$; $\alpha = 0.002$) between the average rank of profitability and cash crop preferences (Table 8-6). The average ranked profitability was 3.8 for tobacco and food crops, 2.9 for cotton, 1.9 for sesame, 1.5 for paprika and 1.3 for sunflower. That is, cash crops with higher average ranked profitability were more likely to be preferred. This suggested that one could predict with great accuracy smallholders' preference for a cash crop in a region by simply using ranking of different aspects of profitability, summing the rankings and then averaging them. This simple and quick method of determining

smallholder cash crop preferences could be taught to development officers who were less likely to use statistical methods because of the complex analysis required and lack of statistical tools/software in the field.

This further confirmed that indicators of profitability that incorporated more financial and non-financial aspects of profitability correlated better with cash crop preferences than those indicators that incorporated fewer aspects. This also showed that smallholders considered many financial and non-financial aspects of profitability when they decided to cultivate and market a given cash crop. Smallholders preferred to use all the required information of the farming system in their decision-making to be more certain of profit and reduce the risks for possible failure.

G. Summary of Indicators of Profitability

The correlation between indicators of profitability and cash crop preferences by smallholders was higher when the indicators incorporated more aspects of profitability. Overall, subjective indicators of profitability, such as the ranked profitability and farmers' perceived relative advantage had stronger correlations with cash crop preferences than financial indicators of profitability. They considered aspects such as buyer reliability, guarantees for money to be received, dual purpose crops that provided for food and income, crop experience and farm gate price. That is, farmers made rational decisions based on a variety of aspects of the cropping system. Therefore, promoters also needed to look at the context, the system into which the cash crop was being introduced. Promoters needed to do more than selling an idea; they needed to establish a whole package that would improve the financial and non-financial aspects of profitability, and the food security of the smallholders and people in the region.

The proposed average ranked profitability incorporated both financial and non-financial related aspects of profitability. This indicator correlated better with cash crop preferences than any indicator of profitability. In practical terms, one could determine what cash crops smallholders preferred by asking them what the most advantageous cash crop was. Nevertheless, it is recommended that the average ranked profitability be used for a more accurate determination of cash crop preferences under field conditions. This indicator (average ranked profitability) could also be used to identify the financial and non-financial

aspects of profitability that needed to be improved to obtain a higher profitability and subsequently improve the chance that the crop would be selected for cultivation.

8.5.4 Regression Model

The study also determined a multiple regression model involving cash crop preferences as a dependent variable and the ranked financial and non-financial aspects of profitability discussed above as independent variables. Table 8-8 provides the statistical information about the models, which suggested that cash crop preferences (CCP) could be estimated from aspects of profitability using the equation below:

$$CCP = -1.205 + 0.182\ PRICRANK + 0.332\ YIELRANK + 0.286\ LABORANK + 0.523\ ACCEXTEX + 0.159\ ACCBUYER\ (R = 1). \quad 8\text{-}1$$

As the statistics suggest (R = 1, the model explains 100% of the variation), the model could predict with great accuracy the likely cash crop preferences by smallholders using ranked price (PRICRANK), ranked yield (YIELRANK), ranked labour costs (LABORANK), ranked access to extension and experience (ACCEXTEX), and ranked access to reliable buyers (AABUYER).

However, important statistics were not computed because of low number of crops (n = 6) and low variability between the data (zero to five and often whole numbers). The regression analysis method excluded the ranked input costs, ranked reliability of the price and ranked access to input. The proportion of these variables' variance not accounted for by other independent variables in the model was relatively small, suggesting strong co-linearity with other factors. These variables were dependent on access to extension and access to reliable buyers mainly through the package deals offered by JFS Company and NGOs operating in southern Niassa.

Table 8-8. Regression model information for estimating cash crop preferences (PREFRANK) (n = 6, Cuamba).

	Un/standardised Coefficients[1]				95% Confidence Interval for B		Correlations			Co-linearity Statistics	
	B/ Beta	Std. Error	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
(Constant)	-1.205	.000	.	.	-1.205	-1.205					
PRICRANK	0.182	.000	.	.	0.182	0.182	0.257	1.000	0.169	0.864	1.157
YIELRANK	0.332	.000	.	.	0.332	0.332	0.943	1.000	0.153	0.213	4.699
LABORANK	0.286	.000	.	.	0.286	0.286	0.486	1.000	0.220	0.588	1.701
ACCEXTEX	0.523	.000	.	.	0.523	0.523	0.829	1.000	0.284	0.294	3.399
ACCBUYER	0.159	.000	.	.	0.159	0.159	0.429	1.000	0.137	0.741	1.350

[1] *Un/standardised means both unstandardised and standardised coefficients. These estimates were the same because ranks of already standardised data were used.*

8.5.5 Current and Projected Future Cash Crop Preferences

The presented study represents data collected during the agricultural season 2001/2002. Smallholders' cash crop preferences during this period were explained based on the findings of this study. The study also explained changes that occurred in terms of cash crop preferences after 2001/2002 and those likely to occur based on the analysis of financial and non-financial aspects of profitability and the average ranked profitability indicator.

A. Tobacco

Consistently tobacco was the crop of choice because it had the highest average estimated ranked profitability (3.8 together with food crops) (Table 8-6). Tobacco had the required characteristics and support needed to attract more smallholders to prefer it as a cash crop. These factors included a good, rising and secure price, larger yields, low cost-gross income ratio, accessible extension, accessible inputs and reliable buyers. In addition, tobacco profits were high and were twice the profit from food cash crops. The estimated gross income was also the highest. Most importantly, farmers perceived it as the most profitable and most advantageous of cash crops.

The tobacco price was particularly high, with the tendency for continual increases and a guarantee that buyers would pay as promised. The price increase was, in part, stimulated by the competition between two tobacco giants in Niassa province, STANCOM and JFS Company. The first had its tobacco concession in northern Niassa while the second in

southern Niassa[35]. This situation stimulated side-selling, mainly by smallholders situated on the road between Cuamba (JFS Company headquarters) and Lichinga (STACOM headquarters). As a result, each company tended to pay increasing prices and provided an organised buying network to attract smallholders in order to keep side-selling down.

B. Food Cash Crops

The average estimated ranked profitability for food crops (3.8) suggested that food cash crops were equally preferred to tobacco (Table 8-6). This was in line with the percentage of smallholders participating in markets (38% for food crop vs. 40% for tobacco) but different from what the financial indicators of profitability would have suggested. According to smallholders, the food cash crops had the following advantages: guarantee of household food, high yield, low input costs, reliable price, and access to inputs, experience and reliable buyers. Farmers would continue to cultivate food cash crops for sale as long as their profitability was more than half of the most profitable promoted cash crops. It was possible and necessary to increase the percentage of farmers participating in the marketing of food cash crops by helping smallholders increase yield (to about 1800 kg/ha)[36] through use of appropriate practices and inputs[37]. Figure 8-4 suggested that, if no change occured in other crops while increasing the yield of food crops to an amount greater than that of tobacco, the projected preference for food cash crops using average ranked profitability could be higher than that for tobacco. However, smallholders would still prefer tobacco if the projected preference was estimated using the regression model. In summary, one could maintain or increase the percentage of farmers cultivating food crops by helping smallholders increase yields.

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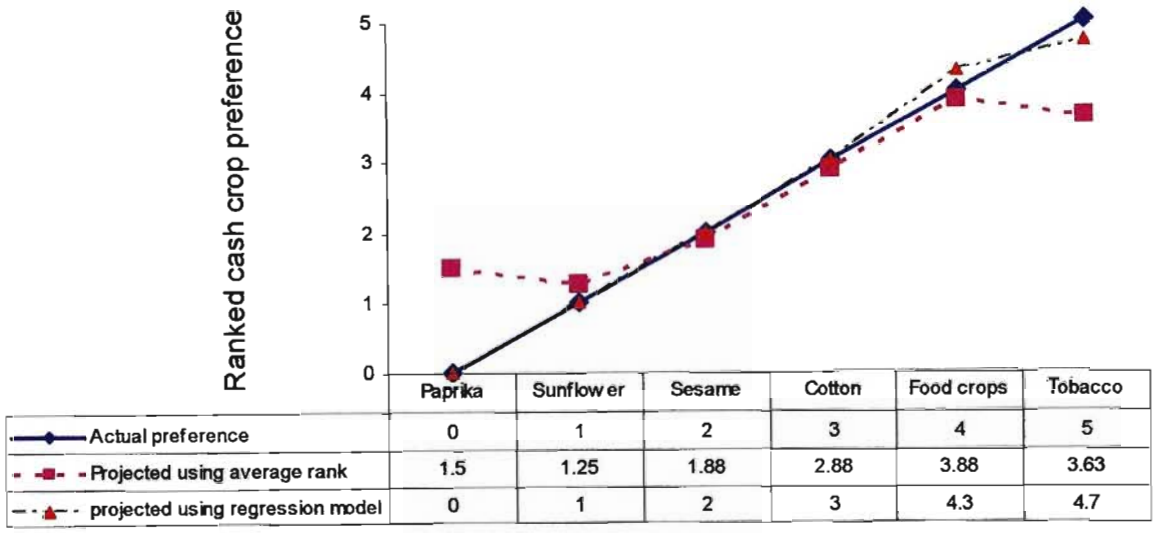
[35] *The government of Mozambique introduced the concession law, which meant that a contract farming company was the sole buyer of the crop that it promoted, provided inputs/credit and extension services.*

[36] *An average yield of 1800 kg/ha for maize was obtainable within Southern Africa (Tickener et al, 2001)*

[37] *Increase in yield implied increase in labour or costs because of increased volume that needed to be harvested and transported. This was particularly important for crops that required time-bound harvesting such as sesame and beans. However, this was not the case for maize because smallholders could harvest maize over the dry months (less labour intensive period) when they had labour available.*



	Paprika	Sunflower	Sesame	Cotton	Food crops	Tobacco
Actual preference	0	1	2	3	4	5
Projected using average rank	1.5	1.25	1.88	2.88	3.88	3.63
projected using regression model	0	1	2	3	4.3	4.7

Figure 8-4. Projected cash crop preferences if yield of food crops was increased in Cuamba.

C. Summary

The existing cash crop preferences could be explained based on the average ranked profitability. Tobacco was likely to continue to be preferred because of related advantages. Food crops could maintain their position or become the most preferred cash crop if yield, extension, access to reliable buyers, reliability of prices and labour costs were improved.

The present and projected cash crop preferences for the remaining crops of cotton, sesame, paprika and sunflower are discussed in Annexure 11. The main conclusions were that to improve smallholders preferences for a certain cash crop, promoters needed to take into account the system that included various financial and non-financial aspects of profitability as discussed in this chapter. In summary, one can improve preference for a cash crop by introducing a cash crop that has a high farm gate price, high yield, lower cultivation and marketing costs, reliable price, accessible extension, inputs and reliable buyers. Smallholders also took into account aspects related to household consumption when deciding to cultivate a given cash crop.

It was possible to estimate preferences for a new cash crop using the average ranked profitability or the regression models. These indicators gave an idea about the likely smallholder market participation for this crop. Analysis of the underlying factors used to estimate the indicators of profitability would provide knowledge about the strengths and

weakness of each crop. This information would help decide the viability of promoting the crops using well-tailored supports.

8.6 Conclusions

Profitability of a cash crop was an incentive for smallholder participation in agricultural markets. However, smallholders went beyond mere financial aspects of profitability (production, price and costs) when thinking about aspects of profitability that influenced their preference for a cash crop. Non-financial aspects of profitability also had a strong influence on cash crop preferences. For example, smallholders thought about: (i) farm gate prices, (ii) yields; (iii) input costs; (iv) labour costs; (v) the reliability of prices; (vi) access to inputs; (vii) access to extension and experience; and (viii) access to reliable buyers/markets. They also looked at aspects related to household consumption when deciding on a cash crop to cultivate. That is, smallholders looked at the whole farming system. Therefore, promoters also needed to look at the context, the system into which the cash crop was being introduced.

It was possible to estimate preferences for new cash crops using the average ranked aspects of profitability or the regression models. This would give an idea about the likely market participation for this crop. The indicators of profitability would also help promoters understand how smallholders saw the cash crop, whether it was viable within their lifestyles. In addition, it could give an indication of supports needed to improve the likelihood of a cash crop being perceived as profitable by smallholders. For example, to improve market participation, one may need to select a crop with a high yield, stable or increasing prices, low cultivation and marketing costs, and crops with access to inputs, extension and markets. In addition, the new crops should not interfere negatively with the food security at the smallholders and regional level. Therefore, promoters needed to do more than just sell the cash crop; they needed to establish a whole package that could improve the financial and non-financial aspects of profitability as well as food security.

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CHAPTER 9 : SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

The main research problem of this study was to determine how relative wealth status, available household labour and cash crops profitability influenced smallholder participation in the agricultural market. The main hypothesis of the study was that wealth status, available household labour and profitability of cash crops would be positively related to smallholders' participation in agricultural markets. Three main sub-problems were analysed based on smallholder farmers' perceptions.

9.1.1 Sub-problem One

Determine whether wealth status influenced smallholder participation in agricultural markets. It was hypothesised that wealth status would be positively related to market participation where agriculture was the main economic activity such as in southern Niassa. Based on this expectation, a sub-hypothesis was proposed for investigation: wealth-ranking factors (most of them household socio-economic characteristics) would be positively related to market participation where agriculture was the main economic activity.

9.1.2 Sub-problem Two

Analyse labour aspects that influence smallholders' cultivation of cash crops and subsequent participation in agricultural markets. This sub-problem had three main sub-hypotheses:

(i) Other factors being held constant, smallholders' cultivation of cash crops and subsequent participation in agricultural markets would be inversely related to crop labour requirements (CLR) where manual labour was the main source of energy;

(ii) Other factors being held constant, available household labour (AHL) would be related positively to smallholders' cultivation of cash crops and subsequent participation in agricultural markets where manual labour was the main source of energy; and

(iii) Other factors being held constant, the ratio AHL/CLR during peak periods of agricultural activity would be positively related to smallholder participation in agricultural markets.

9.1.3 Sub-problem Three

Determine how various financial and non-financial aspects of profitability and indicators of profitability calculated from these aspects could be used to predict smallholders' cash crop preferences. It was hypothesised that:

(i) Financial and non-financial aspects that influenced profitability such as farm gate price, yield/production, cost of inputs and labour, reliability of the price, access to inputs, access to extension and access to reliable buyers would also influence smallholder preference for a cash crop; and

(ii) Indicators of profitability that incorporated more financial and non-financial aspects of profitability would better predict smallholder preference for a certain cash crop than those indicators that incorporated only financial or fewer aspects.

The importance of this study was then also to identify simple and readily determinable indicator/s of profitability that best predicted smallholders' cash crop preferences, which could be made available for use by development practitioners in the field.

In this study, agricultural market participation was defined in two ways. In the first definition, agricultural market participation reflected the number of cash crops sold. This definition was used when comparing households or groups of smallholders in terms of their participation in agricultural markets. In the second definition, agricultural market participation reflected the percentage of farmers marketing a particular cash crop. This definition was used when comparing cash crops in relation to smallholders' participation in the agricultural markets.

9.1.4 The structure of the Chapter

In the following section, three research areas that are related to the three research sub-problems are discussed. This refers to wealth status and wealth-ranking (9.2), labour aspects (9.3) and profitability aspects (9.4) influencing smallholders' participation in agricultural markets. Under each sub-problem, conclusions are presented and related to each of the hypotheses stated above. Other conclusions that emanated from the research are also discussed. Following a conclusion or a set of findings, the author provides recommendations based on the generated knowledge for cash crop development programmes and research.

An overall conclusion for the study was provided in the form of a conceptual framework of factors influencing agricultural market participation accompanied by an explanation (Section 9.5). Finally the study discussed the recommendations for the possible descriptive and applied research projects likely to add knowledge on factors and strategies influencing smallholders' participation in agricultural markets.

9.2 Wealth Status, Wealth-ranking Factors and Market Participation

This section reports conclusions and recommendations based on hypotheses about wealth status and wealth-ranking factors influencing smallholders' participation in agricultural market.

9.2.1 Wealth Status vs Participation in Agricultural Markets

Based on information from focus group discussions (FGDs) the number of cash crops sold were positively related to wealth status. Agricultural market participation in this study was reflected in the number of cash crops sold. Therefore, based on FGD, it was concluded that the wealthier the smallholder, the larger the number of cash crops sold, and the greater the participation in agricultural markets.

Statistical analysis confirmed the hypothesis and the above conclusion from FGD that wealth status and market participation (expressed as the number of cash crops sold) were positively and significantly related. Wealthier households participated in agricultural markets because they had more resources to invest into cultivation of cash crops than poor households. Overall, this meant that some of the limitations to agricultural market participation were due to lack of wealth in the form of human, financial and/or material resources that could be invested for the cultivation of cash crops. However, this does not reflect whether smallholders generated their wealth from agriculture nor whether they were previously wealthy (this was not part of the study).

Recommendation:

Strategies that improved the wealth status of rural households were likely to stimulate smallholders' participation in agricultural markets. Wealth could be increased by improving some of the following household resources:

(i) Human resources by stimulating household and external labourers to provide labour for household agricultural work;

(ii) Financial resources by making available the credit for investment in the cultivation of cash crops. Farmers (88%) pointed to the need for credit for solving the casual labour shortage and increase the effective labour availability (Table 5-16). However, respondents also showed a desire for subsidised credit, or as expressed, they wanted credit with a very low interest rate. Credit was a key issue for advancement of agricultural markets in Africa, specifically in southern Niassa. On one hand, farmers were short of cash and assets/collateral, but needed credit to pay for inputs and agricultural services. In addition, such farmers have failed many times to repay these loans. On the other hand, efficient smallholder lender schemes were needed to avoid the mistakes of the past that have led many banks to closure (Farson-Baidu *et al*, 1997). In spite of the difficulties, credit was a recommended strategy for improving agricultural market development activity and therefore there was a need to find an efficient way of implementing it. JFS Company input/credit could provide a good example for a successful input/credit scheme.

(iii) Material resources by facilitating with improved agricultural technology to increase agricultural productivity.

9.2.2 Wealth-ranking Factors and Participation in Agricultural Markets

Based on information from focus group discussions (FGDs), wealth-ranking factors such as the (i) number of livestock, (ii) number of implements, (iii) number and ownership of bicycles, (iv) number of effective labourers and (v) number of cash crops sold were positively related to wealth status. The FGD also suggested that wealth-ranking factors were implicitly related to the number of cash crops sold. It was concluded that wealth ranking factors were (at least implicitly) positively related to smallholders' participation in agricultural markets.

Statistical analysis of socio-economic data also confirmed that livestock, number of effective labourers, number of implements and number of bicycles were positively and significantly related to wealth status in conformity with FGD information. The amount of food for the household and the size of the field (both wealth-ranking factors) were likely to be related positively to wealth status such as indicated in the FGDs. However, no quantitative assessment was performed for these two socio-economic data.

That is, if wealth status was positively related to market participation then these wealth-ranking factors would also be positively related to smallholder participation in agricultural markets. Statistical analysis confirmed that wealth-ranking factors such as number of livestock, number of effective labourers, number of implements and bicycle ownership were positively related to the number of cash crops sold. Therefore, it was concluded that wealth ranking-factors were positively related to smallholders' participation in agricultural markets in line with the hypothesis of this study.

Recommendations:

(i) Diversification into livestock should be considered as a strategy for improving agricultural market participation. Binswanger and McIntire (1987) and Kalinda *et al* (2000) suggested that livestock were a major source of income and insurance substitute, and therefore it provided a risk diversification benefit. In addition, livestock were a source of manure, which could be used to increase yield and the profitability of food and cash crops.

(ii) Government, donors and promoting institutions should facilitate assess to agricultural implements and the introduction of improved agricultural technology to stimulate smallholders' participation in agricultural markets.

(iii) The influence of bicycle ownership on participation in agricultural markets had to do with access to transport facilities. Therefore, improvement of roads, location of villages and fields near these roads, and establishment of buying networks in or closer to these villages will alleviate transport costs, facilitate search for information and subsequently improve smallholders' participation in agricultural markets.

(iv) Increase in diversification in cash crops for the household should also be seen as strategy for improving smallholders' cultivation of cash crops and subsequently participation in agricultural markets. It is important to stress that a diversified cropping system in terms of cash crops, such as in southern Niassa, did not translate automatically to smallholders' diversification of cash crops because these crops competed for the household labour[38]. In such a situation, smallholders had more choice of cash crops but had to select one or few to fit into their limited labour and/or land resources. Household diversification in cash crops was possible when cash crops were intercropped (with food crops and/or

38 Where land was scarce, cash crops could also compete for the household land resources.

between cash crops), cultivated in relay cropping, or cultivated during rainy as well as dry seasons to maximise the efficiency of utilisation of household effective labourers.

9.2.3 Effective Number of Labourers and Participation in Agricultural Markets

The number of effective labourers was found to be the most important factor influencing smallholder participation in agricultural markets when taking isolated factors into consideration, explaining 20 percent of the variation of number of cash crops sold. This finding was also in line with smallholders' suggestion that labour was the most important socio-economic factor influencing their participation in agricultural markets (see Section 9.2.1). Nji and Sama (1987) also found similar results in Cameroon where labour limited the cultivated area to about 2.6 ha per household. It was concluded that the number of effective labourers of the household influenced household wealth and its participation in the agricultural market.

Recommendation

To involve more smallholders, promoters needed to look for solutions that would increase the number of effective labourers working in household fields. In practical terms, this increase was possible by facilitating households to employ external labourers to work in their field. This implied access to financial resources.

9.2.4 Non Wealth-ranking Factors and Participation in Agricultural Markets

Age, literacy level and gender status were not indicated as wealth-ranking factors during the FGD. Statistical analysis (interval limits) also found that there was no difference in terms of wealth status between people of different ages and literacy levels. However, there was a difference in terms of wealth between households headed by female and those headed by males who were married. No female headed households (divorced, widows, second wife, single with children and single without children) were considered as wealthy in this study. A similar finding was observed by Mukherejee (1992) in West Bengal where households headed by widows were considered the poorest. Further investigation in this study found that this was so because effective labour from female headed-households (1.4) was less than that of the poor (1.8). Therefore, being female could be related indirectly to poor wealth status through the number of effective labourers.

It was expected that factors not mentioned as wealth-ranking factors were less likely to be related to the number of cash crops sold, and subsequently less likely to reflect participation in agricultural markets. The study also confirmed the converse hypotheses, in which there was no relationship between age, gender/marital status and market participation. Makhura (2001) found that there were no gender differences affecting the marketing level of some agricultural commodities in Northern Province of South Africa. This further confirmed that factors not indicated as wealth-ranking factors were less likely to correlate positively with agricultural market participation.

However, there was a negative and significant relationship between literacy level (another factor not indicated for wealth-ranking) and agricultural market participation. However, this conclusion was contrary to what has been theorised by Nji and Sama (1987), Akesson (1994), Fenwick and Lyne (1999) and Masuku *et al* (2001) who found a positive relationship between literacy level and participation in agricultural programmes. Makhura (2001) also found that literacy levels related negatively (but not significantly) with maize sales in Northern Province (Limpopo), South Africa. Mook (1981) expressed that the differences in adoption between the educated and non-educated declined with increasing extension or provision of information. According to Feder *et al* (1985) education had no impact on adoption of agricultural technology in regions with traditional agricultural practices.

Educated people in southern Niassa were predominantly younger, unmarried and poor and could be characterised as lacking in effective labour, and financial and material resources. Therefore, lack of financial and material resources to pay casual labour constrained educated and younger households from participating in agricultural markets. In addition, educated young people with high expectations waited in vain for "good jobs" outside agriculture and therefore, did not put their efforts into cropping activities.

Recommendations:

(i) Government, donors and institutions promoting cash crops development programmes in southern Niassa needed to take into consideration that 10% of the households headed by females were the poorest and lacked effective labour to participate in these programs. These households could be encouraged to

participate in the agricultural markets when they were facilitated to solve labour related problems.

(ii) Planning of rural development programmes should take into account that younger people did not see agriculture as a viable economic activity for improving their standard of living. These younger people could be attracted into cash crop development programmes if highly profitable cash crops were promoted, for example. However, there was also a need to look for off-farm activities that were likely to attract younger people.

9.2.5 Wealth-ranking Tool to Identify Factors and Evaluate Market Participation

The study also concluded that the wealth-ranking tool was suitable for identifying socio-economic factors influencing agricultural market participation. Such a simple and quick method could save time and resources and allow practitioners to assess socio-economic factors that influenced market participation at field level. The wealth-ranking tool could also be used for evaluating agricultural market development programmes.

Recommendations:

(i) Use wealth-ranking to narrow questionnaire design and save time with data collection, processing and analysis. This tool could identify the wealth-ranking/socioeconomic factors that influenced participation in the agricultural markets. These factors could be used in the design of cash crop development programmes. In addition, questionnaires for research (or projects design) could be limited to these factors instead of collecting, processing and analysing a large amount of information that was less likely to influence agricultural market participation.

(ii) Use the wealth-ranking tool for evaluation and applied research as follows: (a) perform a wealth pre-status analysis; (b) implement a cash crop development programme; (c) perform a wealth post-status analysis; (d) observe changes on wealth-ranking factors (type and amount) between pre- and post-wealth status analysis; and (e) observe households that have moved from one wealth status to another. The wealth-ranking criteria would be higher and/or household would improve their wealth status status if the cash crop development programme had a significant impact in household standard of living.

9.2.6 Summary

The following were the conclusions on wealth status relationship with participation in agricultural markets:

(i) Wealth status was positively related to market participation;

(ii) Wealth-ranking factors were positively related to market participation;

(iii) Effective number of labourers was the most important socio-economic/wealth-ranking factor influencing participation in agricultural market;

(iv) Generally, factors not used as wealth-ranking factors, were not related to agricultural market participation; and

(v) Wealth-ranking tool could be used to assess the socio-economic/wealth-ranking factors that influenced smallholders' participation in agricultural markets. This tool could also serve as an evaluation tool to see the changes in wealth status and in wealth-ranking factors due to the implementation of an agricultural development programme.

9.3 Labour Aspects Influencing Cultivation of Cash Crops

The effective number of labourers was the most important socio-economic factor influencing participation in agricultural markets (9.2.3, Chapter 6, and Chapter 5: Table 5-12). Labour limitations to increasing the cultivated area and increasing agricultural efficiency have been reported in Cameroon and elsewhere (Nji and Sama, 1987; Zaibelt and Dunn, 1998; Abalu *et al*, 1987; Feder *et al,* 1985). Labour should, therefore, be considered as the most important socio-economic factor influencing market participation in southern Niassa; and appropriate strategies need to be designed for smallholders to cultivate cash crops and subsequently participate in agricultural markets. This section shows conclusions and recommendations based on hypotheses about labour factors influencing smallholders' participation in agricultural markets (Chapter 7). Some unexpected findings that were not anticipated in the research proposal are also discussed.

9.3.1 Perceived Labour Demand and Cultivation of a Given Cash Crops

It was found that the percentage of households not cultivating a given cash crop due to labour constraints was significantly and positively related to labour demand as ranked by the farmers ($R = 0.826$, critical $R = 0.700$). Therefore, other factors being held constant, it could be concluded that the labour demand was negatively related to smallholders' participation in agricultural markets in line with the underlying hypothesis.

Unlike ranked labour demand, a positive but non-significant correlation was found between the calculated crop labour requirements based on time and the percentage of farmers not cultivating a specific crop. That is, farmers' ranked labour demand and estimated crop labour requirements were different. In addition, the correlation between labour demands for operations based on farmers' ranking and calculated labour requirements for these operations were also not significant. Assessment of labour demand needed to take into consideration not just the time used for labour, but also smallholders' perceptions of labour requirements for a given cash crop. This perception was dependent on personal experience, skill levels, the importance of the crop, feelings about the work, the intensity of the labour, the pain and the complexity of the agricultural operations required to cultivate a given cash crop.

Farmers considered weeding as the most labour-intensive operation with harvesting following. Weeding limited the area that a smallholder could control, thus limiting production and the marketable volume.

Recommendations:

(i) Promoters needed to select less labour demanding cash crops or provide support that would alleviate crop labour requirements.

(ii) Government, donors and promoting institutions should support the promotion of an existing crop (rather than new crops) that smallholders perceived as being less labour demanding because of experience, skill levels, the importance and feelings they had about the cash crop. Such support would involve creating favourable production and marketing conditions for an existing cash crop.

(iii) Find solutions for weeding problems such as:

- Intercropping (mainly when this was delayed) in that the promoted crops used a field that had already been weeded.
- Using late cropping to shift labour to a period when smallholders were less labour stressed.
- Using cash crops with less time-stress for weeding (and harvesting) that allowed smallholders to weed when they were less constrained in terms of labour.
- Using mechanical solutions such as tractors, motor-cultivators and draught power, and the necessary implements to efficiently perform weeding

operations. Seven percent of the respondents pointed to the need for tractors to alleviate labour demand (Table 5-16). This small proportion of farmers may reflect that agricultural support services were somehow out of the reach of smallholders. Nevertheless, emergence of agricultural support services (agricultural mechanisation, irrigation and transportation) may ease many of the obstacles faced by these smallholders. Therefore, it may be necessary to experiment, on a small-scale basis, to set the stage for future development of this important area of agricultural development.

- Use of herbicides should also be analysed. This method has been tested on an experimental basis in Niassa by the Provincial Extension Services. There was a need for more investigation on the feasibility of expanding this method for routine use, and also the smallholder training required.

9.3.2 Available Household Labour and Participation in the Agricultural Market

Available household labour during peak period was positively and significantly related to agricultural market participation in support of the second hypothesis of this study. The study also noted that households had a potential for untapped labour availability during the dry season.

Recommendation:

Government, donors and promoting institutions should promote cash crop development activities that allowed smallholders to utilise the available household labour that was underused during the dry season. For example, support could involve promoting cultivation activities in lowlands with moisture carryover during the dry season or with small-scale irrigation schemes. Some households hired casual labour to solve the labour problem. A few households also cooperated among members of an extended family (2%) to solve the labour problems.

9.3.3 Ratio AHL/CLR and Participation in Agricultural Markets

The ratio between available household labour and crop labour requirements (**AHL/CLR**) during peak periods represented and could be used to estimate the total area of land that a household could cultivate, that assigned to food crops for consumption and cash crops. That is, for known labour requirements of a crop, the larger the available household labour, the larger the ratio AHL/CLR or the larger area that could be cultivated, the larger the production, and the larger the marketable volume. It was then concluded that the expression

AHL/CLR was positively related to the smallholders' participation in the agricultural markets.

The total area of 2.3 ha estimated using the ratio AHL/CLR was very close to the area of 2.45 ha measured by PAMA (2003). The estimated area of 1.2 ha required to cultivate food for household consumption (estimate based on household size, the consumption requirements and the average yield for maize) was very close to the measured area of 1.22 ha (PAMA, 2003). Further, the estimated potential area a smallholder could cultivate for food cash crops (1.1 ha), tobacco (0.4 ha), cotton (0.9ha) using a simple expression combining AHL/CLR, household size, household consumption requirements and yield were close to the suggested areas by JFS Company and PAMA (2003).

It was also concluded that market participation was a function of household consumption requirements and yield of basic food crops. Consumption requirements negatively affected the labour assigned to the cultivation of cash crops while yield from food crops affected it positively. This conclusion supported smallholders' suggestions that promoters should consider household consumption requirements when designing agricultural market development programmes (see 5.4.1 and 5.4.2). This conclusion was also in agreement with the finding that food availability was a wealth-ranking factor and therefore positively related to agricultural market participation (see Chapter 6 and section 9.2). Farmers only decided to cultivate for cash after ensuring that they had enough resources to cultivate food crops for household consumption.

Labour also affected differential participation in agricultural markets of households of different wealth status. This is because estimates suggested that poor households were likely to spend only 30 percent of their cultivated land to produce cash crops compared to 50 percent by middle class and 70 percent by wealthy households. This difference existed because of differential of available labour between households of different wealth status. It was likely that wealthy households had more financial or material resources (e.g. food, clothes, drink) to pay for "ganho-ganho" than poor households. Further, it was estimated that 32 percent of the sample (n = 287), 40 percent of poor, 28 percent of the middle class and 14 percent of wealthy were less likely to participate in agricultural markets because of insufficient household labour (these estimates also compared well with measured data in

this area). That is, there was a tendency toward less participation in agricultural markets by poor farmers than by wealthy households because of differences in labour availability.

Another finding of this study was that households with insufficient labour to produce enough food crops for household consumption were less likely to participate in agricultural markets. The expression developed in this study also estimated that 26 percent of the sample had insufficient labour to produce enough food crops for own consumption. Van Zyl and Coetzee (1990) reported data for Zimbabwe (15-26 percent) were similar to the above figure. These households did not participate in agricultural markets because their main concern was to produce food for consumption in order to survive. Again, a solution to helping these households to improve food security was a labour related solution. That is, smallholders in this situation were less likely to respond to other cash crop development strategies because their limiting factor was labour. According to Van Zyl and Coetzee (1990), these households were even less likely to respond to price incentives alone.

Recommendations:

(i) Government, donors and promoting institutions should help smallholders attain major labour efficiencies by implementing solutions that allowed them to increase available household labour and, at the same time, decrease the crop labour requirements.

(ii) The expression suggested in this study for estimating the impact of labour on participation in agricultural markets and food availability should be developed and used to provide a prediction of the likely participation in agricultural markets. Such an application would prevent implementation of cash crops development programmes that were less likely to be successful.

(iii) Government, donors and promoting institutions should also facilitate smallholders to increase the yield for food crops as a solution to improving smallholder market participation. Smale (1995) supported that uncontrolled agro-ecological and low applications of yield-increasing technology increased the proportion of the resources that households assigned to food crops for consumption while reducing those assigned for cash crops. Yield increase could be obtained through appropriate agricultural practices, mainly timely sowing and timely weeding, crop rotation, conservation and organic farming techniques. The use of high yielding and drought, disease, pest and weed resistant seeds, the use

of fertilisers and chemicals to control pests, diseases and weeds needed to be considered when an immediate increase in yield was needed. Improved yield also increased the profitability of a cash crop, another factor mentioned by the farmers (Chapter 5 and section 9.2) and analysed in this study (Chapter 8 and see the following section).

9.3.4 Summary

The following was the summary of the conclusions and findings of the sub-problem related to labour aspects influencing smallholders' participation in agricultural markets.

(i) Perceived labour demand was negatively related to household cultivation of a given cash crop.

(ii) Assessment of labour requirements needed to take into consideration not just the time used for labour, but also smallholders' perceptions of labour demand for a given cash crop.

(iii) Weeding was the most labour-intensive operation with harvesting following. Weeding (and harvesting for some crops) limited the area that a smallholder could control, thus limiting production and the marketable volume.

(iv) Available household labour during the peak period was positively and significantly related to participation in the agricultural market;

(v) The Ratio AHL/CLR, which was the expression of land size, was positively related to agricultural market participation

(vi) Consumption requirements and yield of food crops affected the labour assigned to food crop for consumption and the remaining was assigned to cash crops, which meant less subsequent participation in agricultural markets.

(vii) Labour also affected differential participation in agricultural markets of households of different wealth status.

(viii) Households with insufficient labour to produce enough food crops for household consumption were less likely to participate in agricultural markets than those that had enough available household labour.

9.4 Aspects of Profitability Influencing Cash Crop Preferences

The majority (53%) of the respondents reported that they participated in the market of those cash crops that helped them make money. Boeteng *et al* (1987) and Anderson (2003) also stressed the need for profitable cash crops to stimulate participation in agricultural markets. This means that smallholders in southern Niassa would respond to crop profitability

incentives. The section below presents and discusses the conclusions and findings from the analysis of profitability aspects influencing smallholders' participation in agricultural markets. This study also presents the recommendations concerning the application of these finding in cash crops development programmes and researches.

9.4.1 Farm Gate Price, Yield and Cash Crop Preferences

The farm gate price, yield, and costs for inputs and labour were some of the financial aspects of profitability analysed in this study. The study found that smallholders preferred a crop with a higher unit price and/or high yield than a crop that had a lower farm gate price and/or lower yield. The ranked farm gate price ($R = 0.257$; $\alpha = 0.311$) and ranked yield ($R = 0.943$; $\alpha = 0.002$) correlated positively to smallholder cash crop preferences in agreement with the underlying hypothesis of the study.

In addition to being significantly related to cash crop preferences, ranked yield was the single most important factor that best explained the variation on cash crop preferences, explaining about 86 percent of its variation. However, it was shown that yield incorporated the effect of good extension and access to inputs in a package deal such as those provided by JFS Company for tobacco and cotton, and NGOs for some other cash crops. Apart from increasing profit, yield, as concluded in Chapter 7 and section 9.3.3, influenced market participation due to its effect in reducing the labour or the area required to cultivate food crops for household consumption while increasing the area required to cultivate cash crops.

The ranked input costs ($R = 0.147$; $\alpha = 0.394$) and ranked labour costs ($R = 0.486$; $\alpha = 0.164$) correlated positively with cash crop preferences in accordance with the hypothesis although the relationship was not significant. This suggested that, other factors being held constant, farmers would tend to prefer cash crops with lower costs.

Recommendations:

(i) Highl value crops (higher farm gate price and/or high yield) should be promoted in order to increase the profitability of cash crops and therefore improve smallholders' participation in agricultural market.

(ii) Government, donors and promoting institutions should support cash crop development activities that provide inputs and extension with the main purpose of increasing yield.

(iii) Provision of "subsidised" seeds to farmers in line with the smallholders' suggestions in Chapter 5 should be seen as a strategy for stimulating smallholder preference for a cash crop. However, to be viable financially, this "subsidised" cost needs to be accounted for in the farm gate price. In addition, this strategy should be planned on a short-term basis (to prevent dependency) during the early stages of introducing a profitable cash crop. JFS Company did so continuously with cottonseed and World Relief-SempreVerde attempted it with sesame and birds eye chillies seed.

9.4.2 Reliability of Price, Access to Inputs, Extension, Experience and Reliable Buyers and Cash Crop Preferences

The ranked reliability of price ($R = 0.829$; $\alpha = 0.021$), access to inputs ($R = 0.600$, $\alpha = 0.104$), access to extension and experience ($R = 0.829$; $\alpha = 0.021$) and the ranked access to reliable buyers ($R = 0.429$; $\alpha = 0.198$) were positively related to cash crop preferences in line with the underlying hypothesis of the research. These results also supported smallholder suggested factors and strategies influencing their participation in agricultural markets (Table 5-12, Table 5-14 and Table 5-15). The majority of the farmers expressed the need for implements (61%) and inputs (53%), mainly seed, as factors for improving their participation in agricultural markets. Provision of inputs such as improved seed was stressed as an essential strategy to agricultural market development activities elsewhere in Africa (Key *et al*, 2000; Cairns and Lea, 1990). Bias and Donovan (2003) and Jeje *et al* (1998) also expressed positively the need for inputs to intensify agriculture. Seed was the beginning of a plant's life and subsequently of an agricultural development activity. Hence, one could not conceive an agricultural market development programme without including seed provision.

Ease of cultivation of the crops (which was a result of experience) was reported as influencing market participation by 9% of smallholders for cotton, 5% for tobacco and 3% for sunflower (Table 5-13). Farmers (22%) also expressed the need for an output market. They specifically required buyers to be honest or reliable in relation to the buying prices. Farson-Baidu *et al* (1997) acknowledged that lack of access to output markets could reduce smallholder income to zero. An agricultural market development programme could only reach its objectives when linked to a strong and reliable market for smallholders' outputs.

Farmers commonly distrusted promoters in relation to whether the promoters would pay the price promised; whether they would provide the required support; whether they would buy

the promoted cash crops; whether they would use inaccurate scales; and/or whether they would downgrade the quality of products (farmers' responses in Chapter 5). This is because of bad experiences that farmers have had. In addition, the short-term nature of many NGO projects also disrupted the marketing system when no appropriate exit strategies were planned. According to smallholders, distrust of JFS Company was greater because of potential downscaling or downgrading of the products. Therefore, there was a need for strategies that reduced distrust when designing and implementing an agricultural market development programme for southern Niassa.

A key understanding and finding of this study was that financial aspects of profitability were not the only factors that motivated smallholders to prefer a certain cash crop. Rational decision-making about the actual risk factors or the non-financial aspects of profitability that influenced the likelihood of achieving the expected profitability would have a greater influence on smallholders' preference for a given cash crop.

Another important finding was the "package deal effects" in which smallholders preferred those cash crops that were supported with a package that included good and reliable prices, extension services, input/credit provision and a market for products. For example, farmers believed the promoter's information about price if the promoter was also taking risks by investing its resources to provide inputs/credit, provide extension and ensure buying of the promoted products. Proper extension enhanced yields and provided information about the availability and proper use of inputs. This finding brought to the fore the need for an integrated agricultural market development strategy, in which an ensemble of strategies incorporating financial and non-financial aspects of profitability were packaged together, where one or more strategies enhanced the results of other, to bring about smallholders' improved participation in agricultural markets.

Recommendations:

To improve smallholders' preference for a cash crop and subsequent participation in agricultural markets, promoters needed to provide the following package:

(i) Information and assurance about the farm gate price. Delgado (1999) considered technical and market information as a productive element of human capital in farming. Therefore, provision of relevant information about production and

markets should be seen as an integral part of an agricultural market development programme.

(ii) Promotion of high value crops (good price and yield);

(iii) Guaranteed access to inputs. For example, poor accessibility of inputs, mainly in the form of seed, was an important factor affecting non-cultivation of cash crops promoted by NGOs such as sesame, sunflower and paprika (Table 5-12). The availability and access to inputs by itself implied a change in the environment of existing practices. Therefore, farmers would be making their decisions according to new criteria and would value cash crops that had better accessibility of inputs (Hornik, 1993).

(iv) Ensure that a proper extension system was in place to help smallholders use appropriate practices and inputs to obtain good yields. Smallholders indicated that lack of extension/personal experience (e.g., more than 50% for paprika and 11% for sunflower) influenced their market participation (Table 5-12). They specifically advised promoters to provide an appropriate extension support that helped them gain knowledge and skills not just about agricultural production activities but also about marketing of their outputs (Table 5-15). The importance of an extension service in improving smallholder participation in agricultural markets was also expressed by Masuku *et al (*2001) and Delgado (1999).

(v) Ensure that products were bought at appropriate prices, timeously and in the right place (close to the villages); and

(vi) Train smallholders in using scales and grading their own products and incorporate government officials (or independents observers) to oversee the buying process in order to reduce distrust.

9.4.3 Crop Indicators of Profitability and Cash Crop Preference

The following indicators of profitability were correlated with cash crop preference:

(i) Profit1 that takes into consideration total sales and total costs (labour and inputs) ($R = 0.355$; $\alpha = 0.245$);

(ii) Profit2 that takes into consideration total sales and input costs ($R = 0.065$; $\alpha = 0.452$);

(iii) The ratio of Profit2 for promoted cash crops to food cash crops ($R = 0.065$; $\alpha = 0.452$);

(iv) Ranked profitability ($R = 0.508$; $\alpha = 0.152$);

(v) The perceived relative advantage of a cash crop ($R = 0.732$; $\alpha = 0.049$); and

(vi) The average ranked aspects of profitability ($R = 0.947$; $\alpha = 0.002$);

The study found that the correlation between indicators of profitability and the cash crop preferences increased as more aspects of profitability were incorporated. The average ranked profitability incorporated more financial and non-financial aspects of profitability and correlated better with cash crop preferences than indicators that incorporated only financial aspects. The perceived relative advantage (which included potential risk factors) was the second best indicator of cash crop preferences. Farmers considered the farm gate price, yield of the crops, the risks involved, the availability of inputs, the extension support, experience about the crops, the reliability of the buyer, the reliability of the price, the profit and the household consumption needs when selecting a crop they thought had greater advantage than other crops. This finding lent support to the need for integrated agricultural market development strategies that incorporate all the activities required to improve smallholders' participation in the agricultural markets.

It is important to stress the finding about the value smallholders gave to food cash crops. Smallholders (23%) reported that they participated in the cultivation of food crops because they provided for household consumption while at the same time providing for income. Respondents advised that promoters needed to consider household consumption requirements when designing and implementing cash crops development programmes. It was acknowledged that consumption was the main goal of smallholders' cultivation (Boeteng *et al*, 1987; Masuku *et al*, 2001). That is, smallholders first spent their resources to cultivate food crops and used the remaining to cultivate cash crops. Therefore, this should be the main assumption for any agricultural market development programme designed for smallholders.

The study also found that the estimated average income/household of size 4.8 members from the cash crop sales (US$182) was small and similar (within US$56 to US$216 range) to income reported in literature for Niassa from 1997 (Davies, 1997; MAP/MSU Research Team, 1997; PAMA, 2003; WR-SempreVerde, 2003). It could be anticipated that (further investigation would be required) it was less likely that cash crop programmes as implemented in southern Niassa improved household income significantly. In addition, the approaches used (or being used) were less likely to help smallholders generate a dollar per

person per day that would correspond to an average income of 1752 US$/household per annum. These smallholder households did not even attain their desired average agricultural income (US$354/annum) or the Mozambican minimum wage (US$401.5/annum).

Although smallholders' access to agricultural markets has improved, and production and export of smallholder output at provincial, regional or national level continues to grow, there is still a need for more detailed study on agricultural growth at household level. This study suggested that agricultural growth (production and income) at the household level with its effect on the standard of living could only be observed if aspects related to household labour and profitability of cash crops were properly addressed.

Another finding, in support of Gladwin *et al's* (2001) conclusion in Malawi, was that promoted cash crops with a Profit2 (sales minus cost of inputs) twice the Profit2 of food cash crops attracted more smallholder food cash crop producers. For example, tobacco with a Profit2 twice the Profit2 of food cash crops had more smallholders participating in its market (40%) than food cash crops (38%). The Profit2 for other crops were less than twice that for food cash crops and none of these crops were preferred over food cash crops. This indicator (ratio of Profit2 of promoted to food cash crops) could better predict the promoted cash crops likelihood of substituting food cash crops at the household and regional level.

Therefore, this ratio could also predict whether a promoted cash crop was likely to influence the food security at the regional and household level. A region's food security could be adversely affected if smallholders cultivated food crops only for household consumption while they cultivated only highly profitable cash crops for sale. Food security would worsen at the regional and household level if many smallholders decided to cultivate only the most profitable promoted cash crop while they expected to buy food for consumption. However, cultivation of food crops alone for household consumption and for sale was not a better option also given the instability of the prices of food crops.

Recommendations:

(i) The concept of a best indicator being the one that incorporated more aspects of profitability also suggested the importance of a package deal when implementing cash crop development programmes (see recommendations in section 9.4.2).

(ii) Opt for the promotion of profitable food cash crops to ensure food security at the household and regional level while at the same time providing for income. Participation in agricultural markets was then likely to increase because food for consumption was the main goal of smallholders.

(iii) Government, donors and promoting institutions needed to evaluate the impact of cash crop development programmes on household income and, if required, review the strategies that allowed households to improve their standard of living.

(iv) For the sake of food security, food crops also need to be supported by appropriate strategies such as:

- Providing good and stable prices;
- Helping smallholders to increase yield through good extension and quality inputs;
- Keeping the production and marketing costs low; and
- Having an organised market network for food cash crops at the village level.

9.4.4 Regression Model as an Indicator for Cash Crop Preference

Ranked price, ranked yield, ranked labour costs, ranked access to extension and experience, and ranked access to reliable buyers were factors that the regression analysis selected as the best predictors of cash crop preferences for southern Niassa. The model together with the average ranked profitability and the smallholders' ranked relative advantage of a cash crop could estimate smallholder cash crop preferences and subsequently the agricultural market participation. Smallholders found it easier to provide ranked data than quantifiable data.

Smallholders' cash crop preferences were found to be rational, based on the indicators of profitability and the underlying aspects that influenced profitability. Apart from confirming the validity of identified factors and strategies influencing agricultural market participation, the study had also determined a simple indicator (the average ranked profitability) that could be used to predict cash crop preferences, a proxy for market participation. Such predictive knowledge of likely cash crop preferences would allow promoters, donors and investors to understand the dynamics of smallholder decisions about cash crops. Such understanding would contribute in the design of appropriate strategies and the successful implementation of agricultural market development programmes to the benefit of both smallholders and agribusiness institutions.

Recommendation:

Use a regression model, the average ranked profitability and/or the smallholder ranked relative advantage in relation to a cash crop to determine the preferred cash crop that smallholders were most likely to cultivate. In practice, the ranked relative advantage of a cash crop was the easiest to use, followed by the average ranked profitability and finally the regression model. However, a reverse situation was observed when comparing these three indicators in terms of precision in determining smallholders' cash crop preferences.

9.4.5 Summary

(i) Smallholders preferred a crop with a higher unit price and/or high yield than a crop that had a lower farm gate price and/or lower yield;

(ii) Yield was the single most important factor that best explained the variation in cash crop preference. But yield also reflected the effect of good extension and access to inputs;

(iii) Having other factors constant, smallholders preferred cash crops that did not incur larger cost for inputs and/or labour.

(iv) Cash crops with reliable prices, accessible inputs, accessible extension, available experience and access to reliable buyers were preferred over crops without these aspects. That is, apart from the financial aspects of profitability, smallholders also preferred those cash crops with characteristics that ensured the achievement of the expected profitability. Smallholders preferred those cash crops that were supported with a package of strategies including good and reliable prices, extension, input/credit provision and buying of products.

(v) Indicators of profitability that incorporated more aspects of profitability were better predictors of cash crop preference. The average ranked profitability and the smallholders' ranked relative advantage of a cash crop incorporated more financial and non-financial aspects of profitability and they estimated with certain precision the smallholders' probable cash crop preference. However, the regression model was the most accurate but difficult to apply in the field.

(vi) From the multiple regression, ranked price, ranked yield, ranked labour costs, ranked access to extension and experience, and ranked access to reliable buyers were the best predictors of cash crop preferences for southern Niassa.

(vii) It could be anticipated that (further investigation is required) cash crop programmes as implemented in southern Niassa did not improve household income significantly.

In addition, it was less likely that the approaches used (or being used) would help household to generate a dollar per person per day.

(viii) Although highly profitable cash crops could improve smallholder income, there was a danger of affecting food security in the region if promoted cash crop profits (sales minus cost of inputs) were twice the Profit2 of food cash crops. Under this situation, smallholders would be more attracted toward cultivating the highly profitable cash crops.

9.5 Theoretical Framework of Factors Influencing Participation

An improved model from the summarised model in Figure 2-1 (and Table 8-1) is provided (in Figure 9-1) using the results of this research. Figure 9-1 reflects the complexity of influences such as key areas in the lilac (purple) headings and the decision factors in the green section of the figure that contribute towards the cash crop cultivation and profitability. Therefore the main conclusions from this study on factors influencing smallholders' participation in agricultural markets could be divided in two key areas: cultivation and decisions.

A. Cultivation determining factors.

These were the socio-economic and agronomic factors that determined household capacity to cultivate cash crops and affected crop yield.

(i) Farmers participated in agricultural markets only when the cultivated area was more than the one required to cultivate food for consumption.

(ii) The total cultivated area was determined by crop labour requirements and available household labour.

(iii) Available household labour was determined by households' active members involved in household farming plus hired casual labour minus household members going to other households as casual labour.

(iv) Casual labour and/or agricultural services (explicitly agricultural mechanisation) could increase the available household labour and decrease crop labour requirements (per unit time), resulting in an increase in the land area that a household could cultivate.

(v) Household income from agriculture, livestock, or off-farm income could be used to pay casual labour and for agricultural services. This income could also be used to pay for agricultural inputs that increased food crop yield.

(vi) Higher yields for food crops reduced the area of land required to cultivate the food crops for consumption and concomitantly increased the area that could be used to cultivate cash crops. Higher yields also increased the volume of cash crops produced that a household could sell.

(vii) Yield could be enhanced by proper extension and application of good agricultural practices, access to inputs (fertilisers, pesticides and appropriate implements), agricultural services (irrigation, agricultural mechanization), agro-ecological factors, species and the variety of the crop being promoted.

B. Cash crop decision factors

Households with extra fields for cash crops needed to decide what crops to cultivate based on the analysis of factors that determined profitability of cash crops such as:

(i) Aspects of profitability such as access to extension (and availability of experience and skills), access to inputs and agricultural services, access to reliable buyers and highly profitable cash crops. These aspects ensured higher marketable volume, certainty that the products would be bought and higher income;

(ii) Profitability of cash crops was dependent on cultivated area, yield, price and costs of cultivation, processing and market access.

(iii) The price of the cash crops was also a function of the species, variety, access to reliable buyers, and agro-ecological conditions (Review of Literature in Chapter 2).

(iv) The costs depended on the price of inputs and the costs of labour.

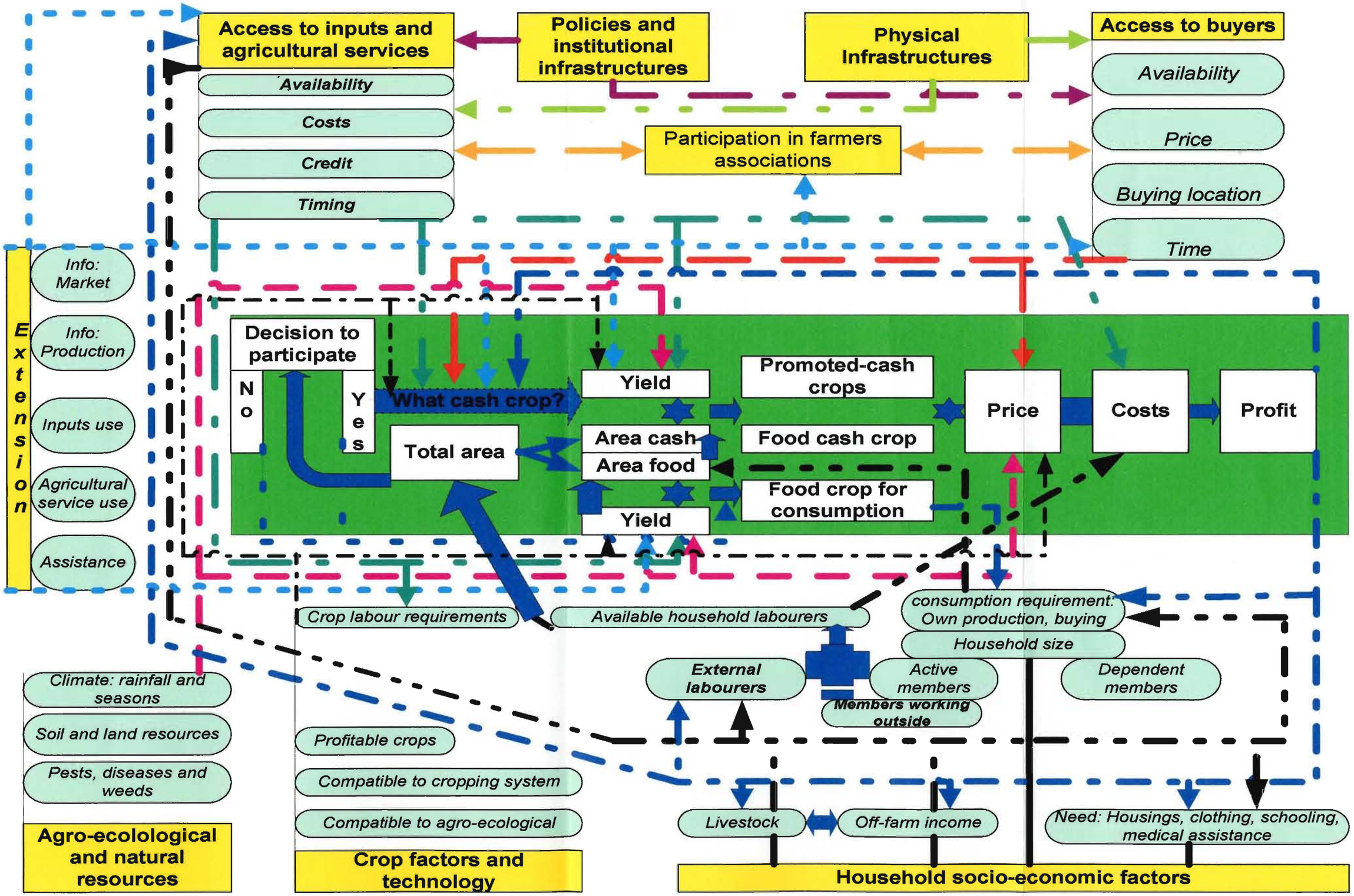

Figure 9-1. Factors and related interactions affecting smallholder participation in agricultural markets.

The main differences between this model and the summary from the literature (Figure 2-1) lay in the following areas:

(i) Narrowing of socio-economic data influencing smallholders' participation in agricultural markets. Gender, age and literacy data have been excluded in this model.

(ii) Emphasises the size of the households that determines the cultivating power (positively related to participation) and consumption capacity (negatively related to participation).

(iii) Focuses more on household income from cash crops, livestock and off-farm income required to pay for external labour and agricultural services and inputs.

(iv) Emphasises household decisions to cultivate a cash crop which depended mostly on the size of the land the household was capable of cultivating.

(v) Focuses more on factors that determine the choice of which cash crops to cultivate such as access to extension (and availability of experience and skills), access to inputs and agricultural services, access to reliable buyers and highly profitable cash crops.

In addition, the model reflects a complex interaction among factors. For example, a successful farmer who had made good profit from participating in agricultural markets would be able to improve household consumption and household standard of living such as having more access to medical assistance and improved housing conditions. This household would also have extra income to invest in livestock, off-farm income generating activities, agricultural inputs and labour to increase the yield and amount of cultivated land.

Understanding of these factors should inform the strategies for improving the effectiveness of cash crop development programmes. It was stressed in this study that strategies should be implemented as a package that allows for positive interaction. For example, apart from its contribution to yield, extension could improve access to inputs and markets. Extension could provide information and could facilitate the distribution and utilisation of inputs. Similarly, extension could provide information about markets such as the buyers, the volume and quality required, the timing of sales and the prices (Figure 9-1).

9.6 Research Recommendations

This section indicates the additional data that needed to be collected to improve the findings of this research and presents future research topics that could provide a better understanding of factors and strategies influencing smallholder participation in agricultural markets. These research topics include: (i) the impact of agricultural market development programmes on standard of living using wealth-ranking tools; (ii) strategies for improving the weeding efficiency of smallholders and implication on agricultural market participation; (iii) acceptability and efficiency of different weeding strategies on agricultural market participation; (iv) use of socio-economic and agronomic data for predicting agricultural market participation and food security; and (v) impact of agricultural market development programmes on agricultural growth at the household level.

9.6.1 Assessment of Household Characteristics

Along with the analysis of this research it was found that a more detailed interpretation of the findings was hindered because of some data that were not collected. These included the cultivated area for the household, accumulated wealth (full assessment of assets and cash income), food availability and household production. Most estimates in the size of the field, food availability and production were compared with data from research, reports and information from cash crop promoters in southern Niassa. It was advisable to determine these data if such a study was to be repeated somewhere else.

9.6.2 Participation in Agricultural Markets vs Standard of Living

Wealth-ranking factors positively related to agricultural market participation in places where agriculture was the main economic activity. This study investigated only some of the agriculturally related variables including number of effective labourers, number of livestock, number of implements and the number and ownership of bicycles. However, other wealth-ranking factors related to the standard of living were not analysed. It could be possible to investigate **"The impact of agricultural market development programmes on standards of living using wealth-ranking tools"**. It was expected that proper market development programmes would improve the standard of living and would raise the level of wealth-ranking criteria. Specifically, the study could investigate the relationship between (i) the use of manufactured products, (ii) housing conditions, (iii) children's schooling, (iv) access to medical assistance and market participation. The study could:

(i) Compare data before and after the implementation of a market development project;

(ii) Compare participants and non-participants in agricultural markets development programmes;

(iii) Examine how the size of income from agriculture markets was related to expenses for the above wealth-ranking aspects that characterised a standard of living;

(iv) Explore how farmers moved from one inferior category of wealth status to a superior one and vice versa; and

(v) Determine how the rankings have changed because of an improved standard of living.

Such a study could tell:

(i) Whether the programme had an impact on improving the standard of living;

(ii) How it had improved and in what aspects of living it had improved; and

(iii) If it had not improved, why it did not improve and what could be done to correct the programme.

9.6.3 Weed Control Strategies vs Participation in Agricultural Markets

Labour constraints limited households from increasing the cultivated area and subsequently limited production and marketable volume. It was found that weeding was the most important limiting factor to increasing the cultivated area. Smallholders often had enough time during the dry season and before the start of the rains to clear and prepare the soil for more land. However, they did not do so because they would not be able to weed all the prepared land. The study on weeding could be performed in two phases:

The first was to analyse possible **"Strategies for improving the weeding efficiency of smallholders: implication for agricultural market participation".** The following hypothesis could be analysed: (i) use of appropriate practices, (ii) a good management of time; and (iii) use of appropriate (mechanical or chemical) technology positively related to weeding efficiency. This research could include the following activities:

(i) Identifying and comparing the local weeding practices with the best practices;

(ii) Local timing of weeding and the recommended timing; and

(iii) The technology utilised and potential technology that could be introduced in the cropping system.

Such a study could tell:

(i) Whether there were some good weeding practices in the cropping systems that some successful households used and that could be generalised through proper extension service;

(ii) Whether there was a need to improve some weeding practices of the cropping system; and

(iii) Whether there was a need for the introduction of possible technologies that would increase the weeding efficiency.

In the second stage, one can analyse the **"Efficiency of different weeding strategies on agricultural market participation".** Hypotheses can be tailored based on previous knowledge of the ease and efficiency of different weeding strategies. Analysis may include:

(i) How easily the strategies were implemented in the cropping system;

(ii) How efficient they were; and

(iv) How they had improved market participation.

9.6.4 Modeling Participation in Agricultural Markets and Food Security Using Socio-economic and Agronomic data

In this study, it was possible to predict some key parameters such as cultivated area, potential market participants, the expected production and income, and food security based on socio-economic and agronomic data. The study compared the estimates with reported average data. Nevertheless, it was recommended that these estimates be compared with actual data about the size of the field, market participation, production, income and food security assessed, preferably, from the same respondents. A study related to: "**Modeling participation in agricultural markets and food security using socio-economic and agronomic data**" could improve the calculation of the expression advanced in this study to predict those parameters in southern Niassa and other places in Southern Africa. The hypothesis and theory stated in Chapter 7 about labour demand could be used in this suggested research. Others hypotheses could be added when modeling for places where sources of energy other than human power (animal traction, hired tractors) were used. One could also analyse how to predict the size of the cultivated areas when smallholders

cultivated more than one cash crop. Apart from allowing an understanding of the factors that influenced agricultural market participation, modeling was a tool that helped in decision making about project design and implementation.

9.6.5 Impact of Agricultural Market Development Programmes on Agricultural Growth at the Household Level

There was doubt whether there was real agricultural growth in terms of production and income at the household level. This study has found that the estimated average income from agriculture was below the farmers' hoped-for agricultural income, below the annual minimal wage for Mozambique and below the average income of a dollar per person. In addition, a superficial look at household income data from agricultural activities did not seem to show that households in southern Niassa had experienced any agricultural growth in spite of improving access to agricultural markets. A study on **"Impact of agricultural market development programmes on agricultural growth at the household level"** could clarify whether the resources being invested into agricultural market development programmes were benefiting the smallholders directly or if it were simply improving the position of export and agribusiness companies directly involved in the marketing of smallholders' products. Such a study could analyse:

(i) Trends of production, sales and investment at the household level along the period of study (5 to 10 years); and

(ii) Compare these trends with those at the regional, provincial and/or country level.

Information could be collected from reports and statistics, from NGOs, donors and Government Department; from key informants and from the farmers. Apart from providing knowledge about the impact of agricultural market development programmes on agricultural growth at the household level, such a study could provide information about weaknesses/strength of such development programmes and possible improvement.

In order to improve the standard of living and increase the success of smallholders' farming it was essential that better agricultural development programmes were implemented. By conducting more research as suggested here all stakeholders could benefit through selection of cash crops with better and reliable prices, high yield, lower production costs relative to gross income, and accessible extension, inputs and reliable buyers.

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Annexure 1. A preliminary study from which the present research was developed

LUKANU, G, GREEN, JM, WORTH, S & GREENFIELD, P, (2004). Farmers' cash crop cultivation decisions in Southern Niassa Province, Mozambique. *Development Southern Africa,* 21(3):531-554.

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Development Debate and Practice

Farmers' cash crop cultivation decisions in Southern Niassa province, Mozambique

Gastão Lukanu, Maryann Green, Peter Greenfield & Steve Worth[1]

The aim of this study was to evaluate socially farmers' decisions about the cultivation of cash crops. It specifically assessed the feasibility of World Relief–SempreVerde scheme by investigating the agricultural promoters; the factors influencing farmers' decisions to adopt, reject, discontinue or continue with the promoted crops; and the support required for improving the food and income security of smallholder farmers. The research took place in nine villages in Cuamba district, Niassa province, Mozambique. It involved a survey of 245 farmers stratified according to gender and wealth. Focus group discussions, questionnaires and interviews with leaders, farmers and managers of promoter institutions were used. A model for introducing cash crops is proposed. This research suggests that agricultural promoters should look to cash crops that can be intercropped with existing food crops; explore dry season agricultural activity; select drought-, pest- and disease-resistant crops; provide markets for existing crops; promote perennial crops; build a well-organised extension, credit and buying system; and/or incorporate livestock in the existing farming system.

1. INTRODUCTION

More than 70 per cent of the poor of Mozambique live in rural areas and, of these, 80 per cent depend on agricultural activities (Wandschneider & Garrido-Mirapex, 1999). There have been attempts by non-governmental organisations (NGOs), state departments and private companies to reduce poverty by promoting cash crops in Niassa province. These players, mostly NGOs, are based in Cuamba city to reach farmers in the Cuamba, Mandimba, Marupa, Maua, Mecanhelas, Metarica and Nepepe districts of Southern Niassa. A cash crop is a crop that is largely sold in the marketplace, thus generating income for the farming household. In this article, cash crops will be divided into promoted or pure cash crops and non-promoted cash crops, depending whether or not there is an institution promoting the crops.

World Relief–SempreVerde (WR-SV) is implementing an Agriculture Outgrower Scheme (AOS) with Swedish International Development Agency and World Relief investment in Southern Niassa. An AOS is similar to contract farming, in which a given company provides the extension, credit and inputs to farmers to produce agricultural

[1]Respectively, Agricultural Manager, World Relief–SempreVerde, Cuamba, Mozambique; and Professor, Professor, and Senior Lecturer, School of Agricultural Science and Agribusiness, University of Natal, Scottsville, South Africa. The cooperation of the farmers, João Ferreira dos Santos Company, German Agro Action, Oxford Committee for Famine Relief (OXFAM) and Acção Christã Interdenominacional de Saúde (ACRIS) is gratefully acknowledged. We acknowledge the financial support from, and use of material and the office of World Relief–SempreVerde. The authors are also grateful to Stephen Gudz for providing insights in the shaping of this article.

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products that the company will buy for resale in the local, regional and international market. Often loans for inputs and equipment are deducted from farmers' sales value of the produce. Extension costs are also taken into consideration to guarantee the financial sustainability of the AOS. Once implemented, the project should secure food and income for the farmers and subsequently lead to the reduction of hunger and poverty, which are two of the most pressing problems for humanity (Agunga, 1997).

To attain project performance, WR-SV proposed the following strategies:

- Promotion of organic paprika (*Capsicum annum*), cayenne (*Capsicum annum*), hibiscus (*Hibiscus sabdariffa* L.), sesame (*Sesamum indicum* L.), lemon grass (*Cymbopogom citratus*) and echinacea (*Echinacea purpurea)* because of market guarantees from oversees buyers.
- Introduction of an extension service staffed by one coordinator, two supervisors and nine extension field workers managed by WR-SV, which also worked with existing crop promoters – Community Organisation Research and Development (CORD) and ACRIS[2] – in Cuamba and Mecanhelas districts with a view to involving farmers served by these NGOs. (Extension in this article is defined as the use of communication methods to provide awareness, knowledge, skills and technical assistance in order to help farmers produce according to the standard set by the buyers.)
- Construction of processing facilities to dry the paprika, cayenne, hibiscus and lemon grass in order to guarantee the quality and conservation of the products for the market.
- Provision of a credit service for seed to guarantee that farmers have the required financial and input support.
- Establishment of a marketing service to sell the products bought from the farmers to local, regional and international buyers.

Growers' willingness to cultivate new crops and to become loyal clients is of paramount importance to the success of an AOS. Adoption of a new crop is a function of risk. Risk is defined as the uncertainty that the potential adopters face when they cannot foresee the consequences of their adoption decision (Schiffman & Kanuk, 1987). While all new crops may involve some degree of uncertainty (i.e. risk), farmers may not cultivate a new crop if they perceive that the risk is too high (Rogers, 1983).

An understanding of the reasons why farmers select the crops they cultivate; why they do not cultivate the crops that have been promoted; and the support they need to participate in cash crop production will help promoters (NGOs, private and government institutions) to identify the appropriate crops, strategies and support required to stimulate smallholder involvement in cash crop cultivation. A fundamental problem that has plagued development efforts over the past 50 years is projects that are planned without sufficient and accurate data on the circumstances of the target population (Agunga, 1997).

The primary objective of this study was to identify the factors influencing farmers' decisions to cultivate a particular crop. The investigation identified why farmers:

- Selected the cash crops they were currently cultivating
- Adopted promoted cash crops, but later discontinued these
- Did not select the promoted cash crops.

[2]Acção Christã Interdenominacional de Saúde.

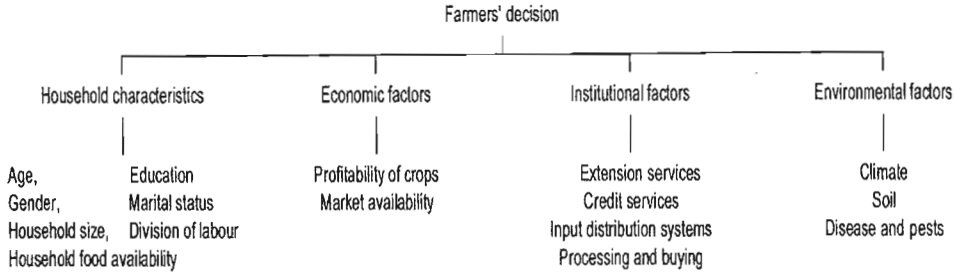

Figure 1: Factors affecting farmers' decisions to cultivate cash crops, Southern Niassa province, Mozambique

To facilitate this investigation, a sub-objective of the study was to identify the agricultural promoter institutions and their strategies of operations as cooperative, contract farming agribusiness and private traders.

It is expected that farmers' decisions to cultivate a given cash crop will be affected by the following factors (see Figure 1):

- Household characteristics, such as age, education, gender, marital status, household size, household food availability, and the division of labour between members of the household who are either active or inactive in the household's farming activities
- Economic factors, such as crop profitability (price, production and cost) and market availability
- Institutional factors, such as availability of extension, inputs and credit services, processing and buying
- Environmental factors that involve the crop's compatibility to existing climate, soil, disease and pest conditions

2. AREA DESCRIPTION

According to the 1997 census, Cuamba district in Mozambique has a population of 126 380. This is about 17 and 1 per cent of the population of Niassa province and Mozambique, respectively. The district has 32 198 households, with an average of four members each (INE, 1997). The population density of the district is approximately 25 people per square kilometre. The average land size under cultivation is about 1,87 ha per farmer (FCCN/N, 2001).

Crops are cultivated mainly during the rainy season, which extends from October to April. This seasonality of crop production has strong implications for food security and income-generation opportunities. Apart from cropping, farmers also obtain their food and income through livestock such as goats, chickens, ducks, pigs, sheep and doves. Other activities include hunting, fishing, wild harvesting[3], selling of local construction material and local fuel, food-processing activities, handcraft and provision of labour to others.

Cuamba is well served with roads that connect the inner villages to the main roads or to Cuamba City, where villagers sell agricultural produce, fuel, construction material, handcraft, and processed food, mainly traditional beer. Traders and agribusiness

[3]Wild harvesting involves harvesting food, medicinal or decorative products that grow naturally on wild land.

companies buy and store the products outdoors, or use depots made of local materials for short-term storage in rural areas. Formal storage infrastructures are available only in the city of Cuamba.

3. METHODOLOGY

This study was carried out in nine villages in the district of Cuamba. The district was divided according to seven different routes from which any villages could be reached. The following were the randomly selected nine villages per route (in italics): *Lichinga route*: Mepica and Macaue; *Metarica route*: Meripo; *Mitukue route*: Mukuto; *Nampula route*: Murusso; *Zambeze route*: Nacoma; *Railways to Malawi route*: Titimane and Gerasse; and *Mecanhelas route*: Mecupa. Villages were selected randomly to ensure that the study results could be generalised for Cuamba and the districts surrounding it.

Initial pilot data were collected from focus group discussions in September 2001, and members comprised traditional, religious, political and government leaders and interested participants from the villages. Two interviewers per village presented themes to the groups for discussion. The aim of this focus group discussion was to obtain an overview of factors influencing farmers' decisions to cultivate cash crops. The focus group discussion also aided in the fine-tuning of the questionnaires used to gather details about the factors affecting farmers' decisions to adopt, reject, discontinue or continue with cash crops.

The leaders provided a list of the members of the villages and classified them according to gender and wealth status. First, the list was divided by gender (male- and female-headed households) and thereafter each gender group was divided by wealth status (wealthy, middle-class and poor), thus making six groups. The proportion of each group was estimated for each village. A stratified random sample based on these proportions and totalling 10 per cent of the members in the villages, was drawn. Detailed data were collected using questionnaires administered later in September by interviewing heads of sampled households.

Interviewers were given a list of the selected respondents to interview. An alternative respondent for each member was also listed to ensure that the representative sampling rates were maintained. If the alternative was also not available, interviewers were requested to identify a household head with the same characteristics as the missing respondents, for example, a poor female-headed household. This was done in order to obtain the opinions and knowledge of different groups in the villages. In those villages where the leaders did not want to classify their members according to social status, visual indicators of poverty (based on housing criteria that the leaders indicated during an earlier focus group discussion) were used to classify the sampled members according to their wealth status (Simanowitz, 2000). A total of 245 household heads were interviewed.

Table 1 shows the characteristics of the sample under investigation. Given the sampling method used, we assumed that these characteristics represented the different routes and villages surveyed. However, it is important to mention that the coefficients of variation between the mean of the sample and those from partial samples based on routes were large for households headed by younger persons (<20 years old), elderly persons (>60 years old), or single persons without children, as well as for middle class and wealthy households. The coefficient of variation was also large in relation to members of the household working in the cities. Thus, although the samples were not homoge-

Table 1. Sample characteristics of farmers from all villages (n = 245)

Age distribution	Number of respondents	Percentage of total (%)	Route coefficient of variation (%)[5]
<20 years old	16	7	**89**
21–40 years old	127	52	12
41–60 years old	69	28	20
>60 years old	32	13	**60**
Gender of head of household			
Male-headed households	164	67	17
Female-headed households	81	33	34
Marital status			
Married[1]	157	64	15
Single without children	5	2	**134**
Divorced, widows, single with children, second wife	83	34	30
Literacy			
Functionally literate	129	53	17
Functionally illiterate	115	47	17
Wealth status			
Poor	139	59	26
Middle	71	28	**47**
Rich	13	13	**49**
Average household member			
Total[2]	4,60		9
Active in agriculture	2,50		6
Outside labour	0,19		**71**
Elderly[3]	0,11		**95**
Children[4]	1,90		11

Notes: [1]Has a spouse who is recognised traditionally as the marital partner.

[2]The average size of the family in the 1997 census was about four members (INE, 1997).

[3]Elderly based on the inability to carry out fieldwork due to the physical limitation of age.

[4]Children who cannot participate in agricultural production activities because of their young age, or because of attending school.

[5]All the numbers shown in bold represent large coefficients of variation.

neous between the villages, these categories represented a small proportion of the overall sample.

When the information obtained from focus group discussions and questionnaires was analysed, a pattern emerged concerning promoters of cash crops and strategies; factors influencing adoption, rejection, discontinuity or continuity; and support needed to improve farmers' involvement in the cultivation of cash crops. Follow-up focus groups were held in some villages to gain further insight into the factors influencing farmers' decisions.

Interviews with the managers of promoter institutions reflected their views about the adoption of crops they promoted, the strategies used, the adoption, rejection, discontinuity and continuity rates, and support that farmers requested to improve their

involvement in the cash crops that the institutions promoted. Data collected from the community leaders' focus groups, the questionnaire and interviews with senior staff of promoting institutions were collated and reconciled to ensure the validity of information.

In general, the farmers were asked to provide the following information:

- Agricultural promoter institutions present in their village, the crops they promoted and the support they provided
- Staple food crops, accompanying food and cash crops grown the previous year and proposed production in the following year. (Staple food crops are defined as crops that provide the main energy component for human nutrition, such as maize, cassava, sorghum, rice, and sweet potato. Accompanying food crops provide protein (e.g. beans) and vitamins (e.g. the leaves of cassava and vegetables).)
- Reasons for continuing to cultivate a given cash crop
- Reasons for discontinuing the cultivation of a given cash crop
- Reasons for not adopting the promoted cash crops
- The support needed from crop promoters to improve farmers' involvement in cash crop cultivation

4. RESULTS AND DISCUSSION

The study identified a number of factors influencing Farmers' selection of crops. These include crop preference; crop promoters; marketability of existing crops; labour demand and complexity of agricultural operations; low profitability; lack of technical assistance, inputs and buyers; lack of land with water resources for dry season cropping.

4.1 Crop preferences

Farmers preferred to cultivate staple food crops, followed by accompanying food crops and, lastly, 'pure' cash crops (Table 2). On average, farmers produced four different crops per year: staple (2,4 crops), accompanying (1,3 crops) and 'pure' cash crops (0,4 crops). Based on the low average of cash crop per farmer, it can be concluded that few farmers were involved in the cultivation of pure cash crops. This suggests that farmers will first select staple food crops, followed by accompanying food crops, sometimes selecting a common cash crop such as tobacco, cotton or sunflower, and then an organic cash crop as promoted by WR-SV. Selection of WR-SV crops will depend on whether they have more advantages than the common cash crops. Cotton and tobacco were the predominant cash crops in Southern Niassa.

Staple and accompanying food crops were cultivated using intercropping methods. Joseph (1987) finds this method more rational for small-scale farmers than the mono-cropping system. Farmers' major concern is to secure their families' basic nutrition through food cropping based on limited labour that allows them to cultivate an average area of 1,87 ha per household. Few farmers wanted to risk cropping just pure cash crops and to use the generated income to purchase food for the family during the year. This is particularly risky during November to February, or during a year of poor harvests when food for sale is scarce and prices are unaffordable. On the other hand, it is less risky for farmers to grow their own food. Boateng et al. (1987) report that the reason for the adoption of cocoa into existing farming systems elsewhere in Africa is due to the ease of intercropping food crops with cocoa. Similarly, farmers in

Table 2. Important staple food crops, accompanying food crops, and cash crops grown in Southern Niassa province, Mozambique (2001/2)

	Staple food crops					Accompanying food crops				Cash crop				Average number of crops per farmer
Crops	Maize	Cassava	Sorghum	Rice	Average	Boer bean	Cow-pea	Bambara bean	Average	Tobacco	Cotton	Paprika	Average	
Total respondents	239	130	105	76	7	124	83	33	7	51	48	3		
% of respondents	98	53	43	31	3	51	34	13	3	21	20	1		
Average number of crops per farmer					2,4				1,3				0,4	4

Cuamba district also cultivated vegetables (2 per cent), fruit trees (2 per cent) and sugar cane for both food and cash.

Farmers prefer to intercrop less drought-resistant crops with drought-tolerant food crops, thus minimising risks from water stress. Intercropping methods are used to improve the chances of production if one crop component fails (Vilamanya, 1987). Maize, the most cultivated staple food crop (98 per cent), and rice (31 per cent) were less resistant to water stress. Farmers complained that they lost yield from maize and rice when the rains were far below the average. But, in the case of poor rainfall, farmers quickly substituted drought-resistant sorghum (43 per cent) and finger millet (2 per cent) for their maize crops to minimise the negative impact of inadequate rain on food security. This could be observed in Southern Niassa and Nampula province during a period of drought when sorghum dominated maize in terms of area cropped. Often farmers planted cassava (53 per cent), which is also drought resistant, in their fertility-decaying fields before they left them fallow. In Southern Niassa, farmers used cassava flour only when there was lack of maize due to poor rains or during the famine months. Most of the accompanying food crops (see Table 2) were also drought, pest and disease resistant. Researchers recognise that poor farmers favour secure production activities that may entail little profitability over crops that are highly profitable but only under specific circumstances (Bernet et al., 2001). This is because farmers behave in a risk-averse way if they live close to subsistence level (Kelley, 1983).

Cash crops in the cropping system in Southern Niassa could be cultivated continually if they were less prone to water stress and attack from micro-organisms and pests. Farmers and officers from the João Ferreira dos Santos Company (JFS) have recognised that cotton, the oldest promoted cash crop, tolerates water stress. However, cotton as well as tobacco requires chemical control for diseases and insects, and JFS has provided such chemicals. Farmers also recognise that sesame and lemon grass are more tolerant to water stress, disease and pests. These crops are likely to be cultivated continually if promoted and purchased from the farmers. Hibiscus (*Hibiscus sabdariffa* L.) also seemed to be less prone to disease. Sesame, lemon grass and hibiscus are well adapted to the Cuamba environment. Sesame is indigenous to Africa (Rowland, 1993). However, organic paprika was vulnerable to water stress, disease and pests (based on the author's personal experience). Paprika may therefore have a high discontinuation rate, mainly when promoted under organic farming. WR-SV needs to select disease- and pest-resistant crops, given the organic character of the cropping practice being promoted.

4.2 Factors affecting the selection of cash crops

4.2.1 Crop promoters

Among the crop selection factors researched were the influence of promoters and the crops they promoted. Cash crops have been promoted in Cuamba by a number of agencies since the 1950s (Table 3). Private companies intervened in two different ways: some provided all the necessary support, such as extension, credit and input distribution, buying and processing as well as selling in the marketplace, while others only bought the products from the farmers, mainly food crops.

In the 1950s, JFS extended its branches in Niassa to promote cotton. It introduced tobacco to Cuamba in 1988, and provides extension to almost all the villages in the district. Apart from a very organised extension and buying network, the company

Table 3. Major promoters of cash crops in Cuamba based on the percentage of respondents who have cultivated the crops (2001/2) (n = 245)

Crops	Cotton %	Tobacco %	Sunflower %	Sesame %	Paprika %	Lemon grass %	Vegetables %
Respondents	52	37	35	24	3	2	3
JFS	100	97					
UCASN			3				
OXFAM			3				
GAA			26				
ACRIS			9	2	67		13
DDA			3				
AGRICOM[1]			3				
Press owners			9				
Own initiative		3	43	98	33	100	87

Notes: Row 1 is the percentage of the sample (n = 245) that have ever cropped the crops, while remaining rows reflect the percentage of respondents who have ever cultivated the crop and who also indicated an institution as promoter.

[1]AGRICOM is an agribusiness company set up by the Mozambican government to commercialise agricultural products from and to the farmers.

provides credit for seed, fertilisers and pesticides. In some cases it also provides credit for agricultural implements. The company uses temporary labour which, under the supervision of key permanent staff, confirms the grading, weight and payment and deducts the credit for inputs during buying. The products are stored in buying stations located in specific villages, and farmers from other villages transport their products on bicycle or by foot, carrying loads on their heads. After buying, products are left in temporary stores made of local material before being transported to the Cuamba City store. The company has processing units for subsequent deseeding, clearing and packing of cotton. Farmers sell dried and graded tobacco to JFS. Due to the experience, coverage and relatively high-quality services of JFS as regards extension, distribution of inputs, buying of outputs, and credit, JFS-promoted cash crops are more likely to be adopted than cash crops from other institutions.

German Agro Action (GAA) is the major promoter (26 per cent) of sunflower and has been active in Cuamba since the 1980s. It provides extension, distributes seed and offers credit to local entrepreneurs with the intention that they would carry on promoting and buying sunflower to supply their machines. A considerable percentage of respondents (43 per cent) cropped sunflower independently. Apart from being cash crops, sunflower and sesame are also food crops, used for oil extraction and ingredients. Some of the sunflower growers had contact with buyers, mostly oil press owners. Some 9 per cent of the sunflower growers indicated that oil press owners, the majority of whom were supported by GAA, promoted the cultivation of sunflower.

The other sunflower promoters include UCASN[4]/Oxford Committee for Famine Relief

[4]União das Confederações e Associações a Sul de Niassa.

(OXFAM), ACRIS, DDA[5] and AGRICOM. OXFAM was established in Cuamba in 1988 and started sunflower promotion in the agricultural year of 2000/1 in collaboration with UCASN. The latter body organises farmers in associations and unions, while OXFAM provides extension and distributes seed on credit to associations. Like sunflower, sesame is grown mostly (98 per cent) through people's own initiative and therefore people generally have some experience in cultivating this crop. Only ACRIS has been identified as a sesame promoter in Cuamba. Unlike the promoters of tobacco and cotton, those of sunflower and sesame only slightly cover the villages of Cuamba with an extension service and barely secure the buying of the outputs. This suggests that, other factors remaining constant, sunflower and sesame are likely to be rejected or have a large discontinuation rate compared with cotton and tobacco, given the lack of an effective extension and marketing network to promote the crops.

Most (67 per cent) of the paprika cultivators identified ACRIS as the promoter of paprika in Cuamba. ACRIS provides pesticide and fertilisers to its paprika growers. The remaining 33 per cent cropped chillies independently for own consumption and the local market. Paprika was promoted in its first year (2000/1) in Cuamba on an experimental basis.

The majority of farmers (87 per cent) who have ever cropped vegetables did so individually, while the remaining 13 per cent identified ACRIS as the promoter of these crops. ACRIS provides an extension service and also distributes seeds, pesticides and fertilisers for vegetable production. Less than 1 per cent of the farmers who have ever cropped vegetables used chemicals. These farmers bought the pesticides and fertilisers for their vegetable gardens directly or through an intermediary, from Nampula or Malawi. Again, the service provided to promote paprika and vegetables was considered less efficient than the one provided by JFS to promote cotton and tobacco. There is a need to improve coverage and efficiency in extension, credit for inputs and the buying network for farmers to consider these crops when selecting cash crops.

Respondents did not regard lemon grass as a cash crop. No institution has promoted this crop before, but people grow it for ornamental purposes in their yards, and some use it as a tea substitute. WR-SV was interested in promoting organic lemon grass for the European Union market as a tea or essential oil. WR-SV needs to guarantee the farmers that it would buy the lemon grass harvest before they would consider cultivating it as a cash crop.

Most NGOs were not directly involved in buying farmers' output (Table 4). However, they linked the farmers to certain buyers who were not always reliable in terms of prices and quantities. WR-SV is attempting to develop an AOS or contract-farming model that would provide extension and credit, and buy, process and sell to the buyers. The UCASN model also serves as example to WR-SV in that the institution built the capacity of farmers' associations to perform the buying and selling function using a cooperative model. However, WR-SV's adaptation to the association model needs to be more business oriented in order to meet efficiency requirements (D'Haese & Bostyn, 2001). Cash crop promotion will create a business environment that is likely to bring competition among associations, traders, and local and international agribusiness companies. Therefore, farmers' associations that promote cash crops should consider how they could survive within this emerging competitive environment (D'Haese & Bostyn, 2001). They will need to consider aspects related to the cost of activities, and

[5]Dirrecção Distrital de Agricultura.

Table 4. Type of services provided by crop promoter institutions in Cuamba, 2001/2

Crop promoters	Extension	Credit	Buying from the farmers	Processing	Selling to the buyer
JFS	Yes	Yes	Yes	Yes[4]	Yes
UCASN	Yes[1]	Yes[2]	Yes[3]		Yes
OXFAM	Yes	Yes[2]			
AAA	Yes	Yes[2]			
ACRIS	Yes	Yes[2]			
DDA	Yes	Yes[2]			
AGRICOM			Yes		
Private			Yes		

Notes: [1]UCASN did not provide agricultural extension directly but helped farmers to organise into associations or unions. OXFAM provided agricultural extension to UCASN associates.

[2]Most NGOs distributed seed for free or with the intent of receiving payment after the harvest, but they seldom received the payment. UCASN also provided money to its association leadership to buy outputs from, and sell inputs to their associates and other members in the villages.

[3]UCASN intermediated between the buyers and the associations. In some cases it searched for buyers and linked them directly to Farmers' associations.

[4]JFS pre-processes cotton; it deseeds and cleans the products.

how these activities can generate a net income to support and expand the activities, should the support of donors and members be reduced.

4.2.2 Marketability of existing crops

More than 63 per cent of the respondents sold food crops, while only 37 per cent sold pure cash crops. That is, farmers would prefer to cultivate a marketable food crop than purely cash crops in order to guarantee food and income required for acquiring products that they cannot produce by themselves (Bernet et al., 2001). These products include food items, production inputs, household utility products and others. The Export Marketing Company and other agribusiness companies have successfully managed to market food crop products without becoming involved in production activity. UCASN has helped its associates to sell part of their maize production and other food crops (the author's personal observation). NGOs, and in particular WR-SV, may succeed in helping farmers to generate an income from existing food crops, if markets were identified. The simple act of identifying a market (local, regional and/or international) for an existing crop can stimulate production.

4.3 Factors affecting discontinuity and non-adoption of cash crops

The discontinuity rate for each crop was calculated as the ratio between the proportion of respondents who stopped cultivating and those who have ever cultivated the crops, multiplied by 100 (Table 5). Cotton (52 per cent) was the most commonly cultivated cash crop, followed by tobacco (37 per cent), sesame (24 per cent), vegetables (22 per cent) and sunflower (18 per cent). The cultivation of chillies and lemon grass as cash

Table 5. Discontinuity rate of cash crops promoted in Cuamba district

		Cotton (%)	Tobacco (%)	Sunflower (%)	Sesame (%)	Chillies (%)	Lemon grass (%)	Vegetables (%)
1	Ever cultivated	52	37	18	24	2	–	22
2	Cultivated in 2000/1	20	21	2	3	1	–	2
3	Discontinuity rate (1–2)/1 × 100	63	44	89	88	50	0	91

crops was still a novelty. Cotton, the longest-standing promoted cash crop, had a discontinuity rate of 63 per cent. This was relatively better than sesame (88 per cent), sunflower (89 per cent) and vegetables (91 per cent). The discontinuity rate for tobacco was approximately 44 per cent.

Respondents' reasons for discontinuity and non-adoption of cash crops have been grouped as follows: not worthwhile; high labour demand; low profitability; lack of technical assistance, inputs and buyers, and lack of land with water resources. Farmers also indicated poor buying, better opportunities, complexity of work, and fear as factors that influenced their rejection behaviour. More details about what farmers felt were impediments to their involvement in cash crop cultivation are given in Tables 6 and 7. A considerable proportion of respondents indicated without further elaboration that it was not worthwhile cultivating the cash crops being promoted. One would assume that these were not deemed profitable, competed with farmers' existing activities, or required additional labour from the household.

These factors emerged from the farmers' varied answers when asked why they discontinued or did not adopt the promoted crops. The interview and questionnaires were not structured, so as not to direct farmers to any assumed factors. This suggests that the data are unlikely to be used for sophisticated statistical analysis, such as the multivariate logit or discriminant models expressing each of these discrete choices as a function of explanatory variables measuring the factors above. Tables 6 and 7 can, however, be used to identify the most important factors affecting discontinuity and non-adoption of cash crops based on the proportion of the respondents who indicated the factors. The main factors identified are discussed below.

4.3.1 Labour factors

Complexity is the degree to which an innovation is perceived to be relatively difficult to understand and use (Rogers, 1983). It is known that perceived complexity of development activities is negatively related to people's participation (Rogers, 1962, 1983; Schiffman & Kanuk, 1987). Participation in an AOS involves a contribution of the household's available labour force. Factors such as the required labour force for the cultivation of a new crop, laziness, illness, singleness, age and youthfulness affect the household's decision to cultivate an additional crop. Labour was the most important factor influencing farmers' decision to discontinue or not to adopt cultivation of JFS's tobacco and cotton. Some farmers requested JFS to provide credit to pay for labour-intensive agricultural operations such as land clearing and weeding. Other farmers

Table 6. The factors affecting Farmers' discontinuity of some promoted cash crops in the Cuamba district

	Reasons identified	Cotton (%)	Tobacco (%)	Sunflower (%)	Sesame (%)	Chillies (%)	Lemon grass (%)	Vegetables (%)
	% Discontinuers (n = 245)[1]	27	8	11	13			5
Not worthwhile[2]	Not worthwhile			4	9			
Lack of, or poor resources[2]	Lack of land		5		3			
	Lack of water							18
	Floods							9
Lack of promoters and inputs[2/3]	Lack of promoters			4	3			18
	Lack of seeds			11	30			18
Labour demand[2]	Labour problems	39	40	15	15			27
	Poor health	6						9
	Lack of husband	3						
	Ageing	3						
Low profitability[2]	Poor production			7	3			
	Low price	22		4				
	Not profitable	19	30	30	15			18
	Poor grading		5					
	Lack buyers			30	33			
Better opportunities[2]	Change to chillies	4						
	Change to tobacco	9						
	Employed		5					
Complexity[2]	Complexity		5					
	Lack of driers		5					

Notes: [1]The first row of data indicates the percentage of the sample that provided the information about factors influencing discontinuity.

[2]The data from subsequent rows indicate the percentage of the total respondents who discontinued due to a specific factor.

[3]Respondents did not mention the lack of pesticides or fertiliser as an influence on the discontinuation of cash crops.

Table 7. Factors that affect farmers' non-adoption of some cash crops that have been promoted in the Cuamba district

	Reasons identified	Cotton (%)	Tobacco (%)	Sunflower %	Sesame (%)	Chillies (%)	Lemon grass (%)	Vegetables (%)
	% Non-adopters respondents	45	63	82	66	87	93	78
Not worthwhile	Not worthwhile	29	22	13	16	10	10	8
Lack of, or poor resources	Lack of land	2			2			17
	Lack of water							8
Lack of promoters and inputs	Lack of promoters		5	2	7	29	12	3
	Lack of seeds			32	41	17	1	26
	Lack of expertise	12						
	Lack of technical assistance		7	2	1	5		2
	Lack of equipment	1						1
	Unawareness and lack of knowledge					9	43	7
	Lack of experience			9	7	15	19	6
Labour demand	Labour	46	41	15	10	7	3	16
	Laziness	2	2	2	1		1	3
	Poor health	17	3	1				2
	Lack of husband, singleness	1	1		1			
	Ageing	1						
	Youthfulness	1						

Low profitability	Poor production			2				
	Low price	16	5	2				
	Less profitable	1		2	4		3	1
	Expensive inputs	1						
	Pest problems			1				
Poor buying	Delayed buying		1					
	Poor grading							
	Lack of buyers	1		20	18	24	9	2
	Change to, or busy with tobacco	4						
	Employed							
Complexity	Complexity		15					3
	Lack of driers		1					
Fear	Fear of repaying the inputs		1					
	Fear of disease					1		
	Church prohibition		1					

Notes: [1]The first row of data indicates the percentage of the sample that provided the information about factors influencing non-adoption.

[2]The data from subsequent rows indicate the percentage of the total non-adopting respondents due to a given factor.

[3]Respondents did not mention the lack of pesticides or fertiliser as factors that prevented them from adopting cash crops.

Table 8. The workload (person days/ha) required to cultivate the promoted cash crops in Cuamba

Operations (person days/ha)	Cotton	Tobacco	Organic sesame	Organic hibiscus	Organic lemon grass	Organic echinacea	Organic paprika/ cayenne
Land clearing	32	32		32	32	32	32
Seedling		8				10	8
Ridging/beds		18			18	23	18
Mulching			*20*	*20*	*20*	*20*	*20*
Transplanting		10			10	25	20
Sowing	12		12	7			
Agroforestry			*5*	*5*	*5*	*5*	*5*
Thinning	7		9				
Weeding	60	30	15	20	20	45	40
Pest control and fertilisation	7	10					10
De-budding		7					
Harvesting	23	42	12	30	15	30	30
Pre-processing (drying, etc.)		63	9	15	166	20	20
Grading		30	8	10	8	5	20
Special fallow			*7*	*7*	*7*	*7*	*7*
Total (conventional/natural)	141	250	65	114	269	190	198
Total (organic)			97	146	301	222	230

Notes: In italics are some suggested organic farming tools (data are estimated as none have tried them yet). Agroforestry is seen here as the intercropping of crops with forest species like *Fairdherba albida* that extract nutrients in the subsoil and deposit them back to the surface through falling and decomposing leaves. Seedling operations for agroforestry species were not taken into consideration, as WR-SV planned to distribute the plants. Special fallow refers to cases where farmers are recommended to grow soil nutrient-giver plants like sunhemp (*Crotalaria juncea*), tephrosia (*Tephrosia vogellii*), or other leguminous plants in order to enrich the soil with nutrients, mainly nitrogen.

requested tractors to minimise the laboriousness of agricultural operations. Other institutions have received similar requests.

Labour data were assessed based on information about the number of days needed to perform an agricultural operation, the number of persons involved and the work per working day. The labour in person days per hectare (ha) was estimated by multiplying the number of persons required to perform a certain agricultural operation on 1 ha, the number of days and the number of working hours per day divided by eight hours (standard working hours per day). Data in Table 8 suggest that cultivation of organic lemon grass (301 person days/ha) is more labour-intensive than tobacco (250 person days/ha), cotton (141 person days/ha), and other crops. Pre-processing (cutting lemon grass to 1 cm, as required by buyers) was a major labour concern. The labour demand for hibiscus (*Hibiscus sabdariffa* L.) was 146 person days/ha, which is only slightly more demanding than cotton (141 person days/ha), while sesame (97 person days/ha) was the least labour-intensive crop. Organic farming requirements (mulch, agroforestry and special fallow) increased the labour demand by an average of 32 person days/ha.

Rogers (1962) confirms that the lower the perceived relative advantage (in relation to labour demand) of an innovation, the less likely the adoption and/or continuation thereof. This suggests that organic crops, such as lemon grass, paprika and *Echinacea purpurea*, are likely to be rejected or will have higher number of discontinuers if labour demand is taken as the most important factor determining farmers' decision to cultivate a given cash crop. Poor households (with a small number of working members, older community members, unmarried, divorced or a second wife in a polygamous situation) may not adopt or keep on cultivating labour-intensive crops such as lemon grass and paprika (Kebede et al., 1990; Fernandez-Cornejo et al., 1994). Like unmarried women, second wives in a polygamous situation do not benefit from their husband's labour or wealth. They are responsible for most agricultural operations, including those assigned to men, like forest clearing. A considerable proportion of respondents who did not adopt (41 per cent) or discontinued (40 per cent) cropping tobacco complained that the crop was too 'complex'. These farmers therefore saw tobacco production as inconsistent or not compatible with their labour availability (Rogers, 1962; Schiffman & Kanuk, 1987; Duvel, 1987).

4.3.2 Low profitability

Another important factor that contributed to non-adoption of cotton was low profitability (see Table 7). During the promotion of new crops, farmers perceive profitable crops as those with a high selling price. However, after production or some experience with the crop, profitability for the farmers means the amount of money they receive at the end of the agricultural season. This can be related to gross income per unit area or gross income per day of work (Table 9).

Gross income per day has been calculated as the ratio between gross income and the required labour force to cultivate a given cash crop, expressed in person days/ha. Annually, tobacco (US$2,56) had the highest gross income per day of work, followed by *Echinacea purpurea* (US$2,03), paprika (US$1,55), sesame (US$1,06), lemon grass (US$0,71), hibiscus (US$0,7) and cotton (US$0,35). The income per person days/ha from the majority of WR-SV's promoted crops was higher than for cotton but lower

Table 9. The gross income of JFS and WR-SV crops as an indication of profitability

Operations	Cotton	Tobacco	Organic sesame	Organic hibiscus	Organic lemon grass	Organic echinacea[1]	Organic paprika/ cayenne
Average yield (kg/ha)	500	1200	600	300	500	300	500
Gross income (US$)	50	641	103	128	214	225	321
Years	1	1	1	1	4	2	1
Cumulative gross income (US$)	50	641	103	128	846	450	321
Gross income per day	0,35	2,56	1,06	0,70	0,71/0,89[2]	2,03	1,55

Notes: [1] *Echinacea purpurea* provides its root harvest in the second year after transplantation. Leaves can also be sold, but this has not been taken into consideration, as no market has been identified.

[2] The first number represents the daily gross income for the first year of cultivation of lemon grass, while the second represents the average for the four-year viable production of lemon grass.

than for tobacco. Farmers may be more interested in cultivating and retaining tobacco in their cropping system than paprika if the gross income is taken as the most important factor determining farmers' decisions to cultivate a certain cash crop. WR-SV needs to suggest ways to promote its crops so that they do not compete with tobacco or other cash crops. Competition with an existing cash crop would be less likely to contribute to an increase in farmers' income. Generally the new crop, if preferred, would substitute the existing cash crop, given the farmers' limited labour to cultivate more land.

Lemon grass is a perennial crop and can yield a financially justifiable harvest for four years. Farmers may incorporate lemon grass into their cropping system as a cash crop if they understand its potential for earning cumulative gross income during the four years, and the advantages of providing steadier income during the rainy season (November–June) and food- and income-hungry months (November–February).

4.3.3 Lack of technical assistance, inputs and buyers

Unlike JFS's tobacco and cotton crops, sunflower, sesame, chillies and lemon grass had the highest proportion of non-adopters. Lack of promoters to provide inputs and technical assistance and lack of buying channels were factors that contributed to non-adoption or discontinuity of cash crops promoted by NGOs, particularly sunflower (see Tables 6 and 7). Good prices and markets should catalyse the expansion of sunflower cultivation. Approximately 43 per cent of those respondents who had cropped sunflower at some time ($n = 85$), or 15 per cent of the 245 respondents indicated that they had cropped sunflower on their own initiative (see Table 3). In the case of chillies and lemon grass, people also complained about lack of experience and technical know-how in growing these crops. NGOs, in particular WR-SV, should reach more farmers if they provide inputs and technical assistance, and facilitate the buying up of all produce. Improving the input distribution, extension and technical assistance, good prices and marketing of smallholder farmers' outputs could be a major stimulus to sustainable intensification of agricultural activities (Whiteside, 1998). Farmers will not adopt the crops these NGOs promote if their marketing system cannot absorb the output of their agricultural production at reasonable and acceptable prices (Hornik, 1993).

Promoter NGOs can also use an agriculture outgrower approach by guaranteeing the purchase of the produce. NGOs can assist by identifying reliable buyers or taking the market risk by collecting produce from farmers in exchange for cash, while waiting for the buyers who will collect from these NGOs. However, as an exit strategy, NGOs need to identify buying institutions or help build private buying institutions that will take the responsibility for private agriculture outgrower companies. Another approach is for NGOs to convert the activities that the development programme has started into business activities to secure their continuation.

It is important to stress, however, that private promoter institutions were concerned with side selling of the crop they promoted. Side selling happens when farmers sell a given product to a buyer different from the one that invested its resources to mobilise and to provide technical assistance and inputs on a credit basis, with the expectation that it would recover the investment during the buying. Side selling can be avoided by promoting crops with characteristics that common traders are likely to avoid (e.g. a crop that requires processing, like lemon grass). Better prices, group pressure and support from local leaders can serve to prevent farmers from side selling the products.

The government can also discourage side selling by prohibiting traders from buying crops they did not promote. It is important to protect promoters' investment during the crop production period; otherwise this will work against the farmers in the long run.

4.3.4 Lack of land with water resources for dry season cropping

Non-adopters of vegetable crops also complained of the lack of land close to water sources for vegetable and sugar cane cultivation. The local market in the city and villages of Cuamba absorbed most of the vegetables and sugar cane produced by the few growers owning land near the riverbanks. WR-SV had not visualised vegetable production as an option for its organic farming crops, and paprika and other vegetables under irrigation are likely to produce better results. If this can become an option in the future, WR-SV or other vegetable promoter institutions will have to deal with the de facto lack of land with available water. Small-scale and appropriately designed irrigation schemes could enable the expansion of irrigated land. Agricultural activity, the most important production activity in the area, is dependent on seasonal rains, which determine seasonal occupation in agricultural production activities. Therefore, the development of irrigation activities would allow smallholder farmers to apply their unused available labour force during the dry season.

4.4 Factors affecting continuity of crops

There was also a need to analyse the positive factors that helped the farmers to continue cultivating cash crops. Farmers and some senior staff from promoter institutions were asked why they wanted to continue cultivating cash crops. Multiple answers were recorded (Table 10). The following factors contributed to farmers' decision to continue cultivating a certain crop: high profitability, secured buyers, certainty of a harvest, and provision of both income and food.

Cotton and tobacco were cultivated more regularly than other crops. People wanted to keep on cultivating cash crops that were profitable and could be sold. Some respondents recognised that they cropped cotton and/or tobacco because these were the only 'true' cash crops available in Cuamba with a secure buyer. JFS senior staff also suggested that certainty about cotton as an 'old' crop accounted for farmers' loyalty to cotton cultivation when compared with tobacco. Despite the lower profit for cotton (see Table 9), farmers were cautious about venturing into tobacco cultivation, which was highly profitable but a 'new' crop. Farmers may spend two or more seasons making sure that it is worthwhile to cultivate tobacco before changing to it. The same may also happen with the cash crops that WR-SV and other NGOs have started introducing in Cuamba.

It is interesting to observe from the data in Table 10 that respondents wanting to cultivate paprika also perceived the crop to be profitable. However, information collected from ACRIS, the first paprika promoter, suggested that more people discontinued paprika cultivation than the small numbers identified in this research. The paprika continuity information for this study came from the village of Muanhupo, which is one of three villages where paprika was successfully cropped in the first year. According to ACRIS staff, different degrees of disease infection among fields caused variability in the results. There is a need to further investigate paprika promotion among small-scale farmers in Cuamba.

Another important finding was related to vegetables. Despite the lack of a formal marketing system, vegetable production was seen as an income-generation activity.

Table 10. Factors contributing to farmers' continuity in cultivating some promoted cash crops in Cuamba

		Cotton (%)	Tobacco (%)	Sunflowers %	Sesame (%)	Paprika/ cayenne (%)	Lemon grass (%)	Vegetables (%)
	% Continuity respondents (n = 245)[1]	24	28	6	7	6	2	16
	Profitable	52	80	27		67		51
Income generation[2]	To make money	24	12	13	6	1		26
	Only true cash crop	9	4					
	Buyer exists	12	1	13				
Secure buyer[2]	Early buying		1	7				
	Personal use		1					38
	Food ingredient			53	100	1		
Consumption[2]	Tea						40	
	Ornament						60	
Liking[2]	Habit	3						

Notes: [1]The second row indicates the percentage of the sample that provided the information about factors influencing continuity of cultivation.

[2]The data from subsequent rows indicate the percentage of the total non-adopting respondents due to a given factor.

About 38 per cent of the respondents wanted to continue cropping vegetables in order to produce income as well as food for the household during the dry season. Thus vegetable cropping can become an important income-generating and food production activity if promoted.

5. RECOMMENDED STRATEGIES FOR CASH CROP PROMOTION IN SOUTHERN NIASSA

By applying the information obtained from the village leaders, farmers and the promoting institutions, additional strategies were identified as being necessary for the introduction of any new cash crop. Farmers attached much importance to issues such as crop preferences; the type of services they required from the promoters; crops that could provide both food and income; labour demand; low profitability; lack of technical assistance; inputs and buyers; lack of land with available water resources; and experience. Strategies were therefore needed to address these situations.

5.1 Intercropping rather than mono-cropping

Intercropping will allow smallholder farmers to generate additional income with less labour and without having to compromise their valuable food crop production. Crops demanding less labour and those crops that do not compete with food crop production activities are likely to be adopted and maintained in the cropping system. With

intercropping, farmers can fit a cash crop in the existing field space of about 1,87 ha per household. Intercropping saves labour in clearing and weeding the land. For example, sunflower intercropped with maize would use an already cleared and weeded land, as sunflower is sown in February after weeding the maize field. Sesame cultivation is also likely to be adopted and continued if farmers intercrop sesame with maize. Intercropping allows crop diversification that will guarantee some food and/or income. It is necessary to perform an agronomic and market study to identify the cash crops that can be grown in the same field with food crops in this area.

5.2 Explore dry season agricultural production activity

Dry season agricultural production activities from wet land or appropriately designed irrigation schemes are likely to create employment during the unproductive dry period of five months, and alleviate labour demand and stress due to both cash and food crop cultivation during the rainy season. This practice will also bring additional land with water resources into production. All these factors will contribute to the adoption of crops that are promoted during the dry season. For example, irrigated paprika can provide a higher gross income additional to existing rain-fed income. However, irrigation in Africa as a development tool has scared many development institutions away from venturing into irrigation investment because of past failures (Rowland, 1993). Most agricultural development activities are promoted during the rainy season, thus creating competition with food crops. There is a need for market research into crops that can be grown during the dry season in wetlands or under small-scale irrigation.

5.3 Select drought-, pest- and disease-resistant crops

Given the organic character of the proposed project and farmers' averseness to risks, drought-, pest- and disease-resistant crops should be investigated to reduce risk for the farmers and the institution. The combination of resistant crops and diversification (referred to in section 5.1) is likely to have a positive effect in terms of risk reduction.

5.4 Labour for perennial crops

Joseph (1987) suggests that an average household can control about 3 ha using manual labour and rudimentary implements if it incorporates perennial crops in its cropping system. This is about 38 per cent more than the existing 1,87 ha per household in Cuamba's cropping system where there are no perennial cash crops although sufficient land is available. Mixing or intercropping of perennial and annual crops characterises most of the cropping systems in West Africa and Asia (Joseph, 1987; Devendra & Thomas, 2002). For example, Devendra & Thomas (2002) estimate that, in Malaysia, some 60 per cent of the total land area was under perennial tree crops. There is a need to identify perennial cash crops that can be intercropped with food crops. Lemon grass, castor and mango are some perennial crops that are already cultivated in Cuamba. Other new perennial crops should also be investigated.

5.5 Market for existing crops

The internal, regional and international markets for agricultural products from Southern Niassa should be investigated. Apart from maize, the list could include dried cassava, dried sweet potato, dried fruit, mungbean and boer bean, which already exist in small

quantities. Fewer expenses for extension (necessary for new crops) will contribute to increased financial sustainability when marketing existing crops. This strategy should encourage smallholder farmers to increase their production of these crops in order to guarantee the surplus for income generation.

5.6 Organisational strategies

To be successful, promoter institutions need to have an extension, credit and buying system capable of rendering quality services to the farmers. A combination of UCASN and JFS models can provide a very sophisticated tool for an AOS in Southern Niassa. This would involve organising farmers' associations that will serve as negotiating centres and collection points from where a private company would collect the products.

5.7 Livestock

Chickens are the most important livestock in Southern Niassa and there is a need for investment to diversify into alternative livestock. WR-SV and other NGOs need to look on livestock as part of improving the farming system because of its organic character. Livestock will help provide the organic fertiliser critically needed in organic farming. Livestock also enhances a steadier annual income together with crop production. A mixed crop/livestock system is an optimal farming system (Bhende & Venkataram, 1995, cited in Bernet et al., 2001). There is a need to research the feasibility of such an approach in the Southern Niassa environment.

5.8 The process of cash crop promotion

The model for cash crop promotion in an AOS should therefore involve the following steps:

- Identification of suitable cash crops
- Market research for potential buyers
- Decisions on the selection of cash crops to be promoted
- Campaigning to raise awareness and knowledge of the crops
- Forming of farmer's groups or associations
- Financial credit for inputs, mainly for risky crops like tobacco and paprika
- Technical assistance with production processes
- Post-harvest processing
- Buying of outputs and selling of inputs
- Marketing or selling of the products to the buyers

6. CONCLUSIONS

Farmers surveyed in this study considered the following factors when making decisions about adopting and retaining cash crops in their cropping system: crops with a dual purpose, or crops that can be consumed and sold; crops that can be intercropped with maize; crops that are resistant to water stress, pests and diseases; crops requiring low labour; profitable crops; and crops promoted by credible institutions in terms of provision of extension, technical assistance and market availability.

Key strategies for the promotion of cash crops, identified in this study, included the promotion of a crop during the dry season to avoid competition with other food and cash crops; finding markets for existing crops to stimulate production rather than trying

to introduce new crops; the introduction of perennial crops that are less labour demanding; the introduction of crops that are resistant to existing environmental conditions; building of well-organised farmers' associations, extension, credit and marketing systems to support farmers; and the introduction of livestock in the farming system to secure a more regular income for farmers and to serve as a source of organic fertiliser.

Agriculture outgrower institutions are private institutions that are committed to the promotion of cash crops by providing the required support (mobilisation of farmers, provision of extension, group development, inputs through credit, buying of products, processing and/or selling of products in the marketplace) in exchange for the farmers' products at a certain price. Side selling is avoided by selecting crops with characteristics that common traders are likely to avoid (e.g. lemon grass requires drying and cutting at a certain size); paying a better price to the farmers; applying group pressure to conform to the process; obtaining support from local leaders for the outgrower scheme; and seeking law enforcement by the government to prevent traders from buying crops promoted by other institutions. NGOs could also follow a contract-farming approach by guaranteeing that farmers' outputs are purchased through suitable links with agribusiness companies.

Private companies can organise buying networks for the crops they promote. The public extension system and/or NGOs need to support agricultural production activities by providing extension and assistance to smallholder farmers. Farmers must be able to manage their fields according to sound agricultural technologies in order to increase production.

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Annexure 2. Southern Niassa Related Agricultural Market Development Institutions.

Institutions	OIKOS	World Relief	UCASN	ESTAM-OS	Movi-mundo	CORD	GAA	ACRIS	InterMond
Donors or investor	EU and others	SIDA/Malonda and others	OXFAM, AMODER, GAPI and others	OIKOS/EU and others	EU and others	EU and others	EU and others	Tear Funds and others	External and others
Headquarters	Mandimba	Cuamba	Cuamba	Mandimba	Cuamba	Mecanhelas	Cuamba	Cuamba	Marrupa
Date of start	1999	2001	1996	N/A	2000	1994-2003	1980s-2003	1995-2003	N/A
Districts of activities	Mandimba	All	All	Mandimba	Mandimba	Mecanhelas	Cuamba	Cuamba	Marrupa
Crop supported	Sunflower, sesame	Paprika, sesame, sunflower, lemon grass	Paprika, sesame, sunflower, food crops	Sunflower, Sesame	Sunflower, sesame	Sunflower, Sesame	Sunflower, sesame	Sunflower, sesame, paprika, vegetable	Sunflower
Type of agriculture	Extensive	Extensive, intensive with lemon grass	Extensive	Extensive	Extensive	Extensive	Extensive	Extensive, intensive with vegetables	Extensive
Association development	Yes[1]	No	Yes	Yes	No	Yes	No	No	No
Capacitating to Gov. institutions	Yes	No	No	No	Yes	Yes	Yes	No	No
Credit provision	No	No	Yes	N/A	Yes	Yes	Yes	No	Yes
Awareness and Extension provision	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No
Inputs: seed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Collection/buying of output	No	Yes	Yes	No	No	No	No	No	No
Post-harvest and processing	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Facilitating Storage	Yes	Yes	Yes	No	No	No	Yes	No	No
Facilitating Selling locally	No	Yes	Yes	No	No	No	No	Yes	Yes
Exporting	No	Yes	No	No	No	No	No	No	No

Continued Annexure 2.

Institutions	OXFAM	Public Extension	JFS	Export Marketing	V&M	Servir Mozambique	GAPI	AMODER
Donors or investor	EU and others	Government and others	Company funds	Company funds and SIDA	Company funds	Company funds	Government and others	Own funds, SIDA, EU and others
Headquarter	Cuamba	Lichinga	Cuamba	Cuamba	Cuamba	Muapula	Cuamba	Cuamba
Date of start	1980s	1987	1990[1]	2000	1999-2002	1997	2001	1998
Districts of activities	Maua, Metarica,	All	All	All	N/A	Maua	All	All
Crop supported	Sunflower, sesame, paprika, food crops	Food crops, and others	Cotton, tobacco	Food crops, sesame, others	Food crops, sesame, others	Sunflower		
Type of agriculture	Extensive	Extensive	Intensive with inputs[2]	No	No	Extensive		
Association development	No	No	No	No	No	No		
Capacitating to Gov. institutions	Yes		No	No	No	No		
Credit provision	No	No	Yes	No[3]	No[3]	No	Yes	Yes
Awareness and extension provision	Yes	Yes	Yes	No	No	No		
Inputs: seed	Yes	Yes	Yes	No	No	Yes		
Collection/buying of output	No	No	Yes	Yes	Yes	Yes		
Post-harvest and processing	No	No	Yes	Yes	Yes	Yes		
Facilitating Storage	Yes	No	Yes	Yes	Yes	Yes		
Facilitating Selling locally	No	No	No	Yes	Yes	Yes		
Exporting	Yes	No	Yes	Yes	Yes	No		Yes

[1]JFS existed in some other form before the independence and farmers stated that they were involved with cotton for over 50 years.
[2]Intensive because JFS provide inputs (fertilisers and chemicals) in order to guarantee production, but extensive because of the type of extension used (farmers spread out widely) and reliance on natural rains.
[3]However, Export Marketing some times provides advances to farmers' associations that alleviate the need for obtaining credit.

Annexure 3. Guiding questions for the focus group discussion involving leaders of the villages (September 09/2002)

Interviewer: ----------
Date: ----------
Beginning time: --- H ---
Village: ----------
Route: ----------

Note taker: ----------
Ending time: --- H — Duration --- H -
Extension worker in charge: ----------
District: ----------

Introduction

1. I am ----------, I have been recruited and prepared to perform a survey about agricultural development activities required to improve the standard of living of farmers.

2. Our aim is to understand the factors influencing your involvement in the sale of promoted cash crops or food cash crops, and the strategies used by different promoters.

3. Information obtained from this interview will be used to advice promoters of cash crop about the best strategies to improve your participation in agricultural markets.

Would you like to share your knowledge and experience about agricultural marketing?

(Explain the need for the leaders to be open and honest in their discussions). I would like to say that we are interested in open and honest information. There are no wrong or correct answers. The most important answer is the honest answer. All the information discussed here is confidential

1. What do you think are the main cropping objectives of the farmers in this village?

2. Do you think that the people you represent have their needs satisfied through cultivation activities? Why?

3. What farmers like to buy or accumulate as remembrance to their agricultural production activity?

4. What things farmers dream to buy or accumulate as remembrance to their agricultural production activities?

5. Indicate, in order of importance, the food crops cultivated in this village?
Staple food

Accompanying food

Others crops

6. Indicate, in order of importance, the cash crops cultivated in this village?

7. What makes farmers to select one and not another crop among different promoted cash crops by JFS, UCASN/OXFAM, or World Relief-SempreVerde?

8. Why have some people in this village never tried to cultivate the promoted cash crops by JFS, UCASN/OXFAM or World Relief-SempreVerde?

9. Why have some people tried but soon they stopped cropping the promoted cash crops by JFS, UCASN/OXFAM, or World Relief-SempreVerde?

10. Why have some people tried and never stopped cultivating these promoted cash crops?

11. What type of support you would like to obtain so that the people can free themselves from poverty through cultivation activities?

12 What criteria do the people use to classify other into wealth status categories? (Conduction of wealth ranking exercise)

13 Ask the chiefs and other people to help complete the list with names of the household-head of (the person in charge of the household), their respective wealth status, gender and promoted cash crop cultivated last season.

Explain that the list will be used to draw some people that will be interviewed for detailed information about agricultural development activities.

Annexure 3 (Continued)

Interviewer: ----------
Date: ----------
Beginning time: --- H ---
Village: ----------
Route: ----------

Note taker: ----------
Ending time: --- H — Duration --- H -
Extension worker in charge: ----------
District: ----------

	Name of the household-head	Wealth status category	Household-head gender	Puata-Puata Area	Promoted cash crop being cultivated

Annexure 4. Questionnaires for household-head (September 2002)

Name of the respondents: ----------
Date: ---------- Note taker: ----------
Beginning time: --- H --- Ending time: --- H — Duration --- H -
Village: ---------- Extension worker in charge: ----------
Route: ---------- District: ----------

Introduction

1. I am ----------, I have been recruited and prepared to perform a survey about agricultural development activities required to improve the standard of living of farmers.

2. Our aim is to understand the factors influencing your involvement in the sale of promoted cash crops or food cash crops, and the strategies used by different promoters.

3. Information obtained from this interview will be used to advice promoters of cash crop about the best strategies to improve your participation in agricultural markets.

Would you like to share your knowledge and experience about agricultural markets?

(Explain the need for household head to be open and honest in their discussions). I would like to say that we are interested in open and honest information. There are no wrong or correct answers. The most important answer is the honest answer. All the information discussed here are confidential

1 Personal and socio-economic information

1.1 Papa/mama how old are you? (mark with a cross in age group where the respondent belongs)

1. Bellow [20] ---- 2. [21 - 40] ----- 3. [41 - 60] ----- 4. Above 60 ----

s/he does not know, try to estimate but put an E before the question to symbolize that the age was estimated)

1.2 Observe and mark with a cross the gender of the respondent

1 [Male] ---- 2 [Female] ----

1.3 Gender/marital status: (mark with a cross the marital status of the respondent)

1 [Does your spouse live here in this house] ---- if not
2 [Are you a single and without children] ---- if not
3 [Other: Divorced, widow, single with children, or 2nd wife] ----

1.4 What is the highest schooling you have you ever attended *(convert to actual education system and mark with a cross)*:

1. [< 4ª Classe] -------2. [4ª - 7ª] ------ 3. [>7ª]

1.5 How many people leave in this house? -------

1.5.1 How many above are 18 or more years old -------

1.5.2 How many are below 18 years old -------

1.5.3 How many actively involved in agricultural activities? -------

1.5.4 How many family member providing ganho-ganho? -------

1.6 Do you have people providing casual labour to your field? 1. [Yes] ---- 2. [Non] ----

1.6.1 How many? -------

1.6.2 What operations are casual labourers often involved?

Operations involved	Mark with a cross	Cost of the operation?	Days required?	How paid?
Land clearing				
Land preparation				
Ridge preparation				
Seedling				
Transplanting				
Weeding				
Application of pesticides				
Application of fertilisers				
De-budding				
Harvesting				
Post-harvest operation				

1.7 Key informers classify this respondent as

1 [Wealthy] ------- 2 [Poor] ------ 3 [Middle class]

1.7.1 The status of the house and clothing suggest that the respondent is:

1 [Wealthy] ------- 2 [Poor] ------ 3 [Middle class]

1.7.2 Complete the following table about respondent implements and assets

Implements and assets	Quantity	Year of purchase	Cost per unit
Hoes			
Machetes			
Axes			
Sickles			
Radio and tape-recorder			
Bicycle			
Sewing machine			
Goats			
Lambs			
Chickens			
Ducks			

2. Cropping information

2.1 What thing and only one thing that motivate you to cultivate land?

1. To produce food ----
2. To generate income ----
3. Just like or love to cultivation land ----

2.2 Complete the table below about the food crops cultivated in the last season (2001/2002) and the crops intending to cultivate next year (2002/2003) (Mark with a cross)

Crops	Cultivated last year (2001/2		Why	To cultivate next season (2002/3)	Why
Staple food crops					
Maize					
Cassava					
Sorghum					
Rice					
Other					
Other					
Accompanying food crops					
Boer bean					
Cowpea					
Bambara bean					
Other					
Other					
Vegetable and fruit trees					
Vegetables					
Sugar cane					
Other					
Other					

2.4 Complete the table below about promoted cash crops cultivated last year (2001/2) and the promoted cash crops pretending to cultivated next year (2002/2003) (Mark with a cross)

Crops	Cultivated last year (2001/2		Why	To cultivate next season (2002/3)	Why
Tobacco					
Cotton					
Sesame					
Sunflower					
Paprika					
Other					
Other					

2.5 Complete the following table to know whether the respondent has ever cultivated, never cultivated or stopped cultivating the promoted cash crops and why.

Crops	Have you ever cultivated			
		If not, why?	If yes and still continuing, why?	If yes and stopped, why?
Tobacco	Yes --- no -----			
Cotton	Yes --- no -----			
Sesame	Yes --- no -----			
Sunflower	Yes --- no -----			
Paprika	Yes --- no -----			
Other	Yes --- no -----			
Other	Yes --- no -----			

3. Crop characteristics

3.1 Complete the table below to classify the following crops in term of labour requirements, resistance to water stress, diseases and pests, and profitability

	Which of the following crops is more labour demanding? (provide a mark of 5 for the most demanding, 4 for the following, and 0 for the least demanding)		**Which of the following crops is more resistant to water stress, diseases and pests? (provide a mark of 5 for the most resistant, 4 for the following, and 0 for the least resistance)**		**Which of the following crops is more profitable? (provide a mark of 5 for the most profitable, 4 for the following, and 0 for the least profitable)**	
	Order	Why	Order	Why	Order	Why
Tobacco						
Cotton						
Sesame						
Sunflower						
Paprika						
Food crop						

3.4 What type of promoted cash crops you would like to cultivate to feel satisfied?

3.4.1 When this crop should be cultivate (what season of the year, at the beginning of the rain in October/November/December, late season in the beginning of February or during the dry season)?

3.4.2 How to cultivate (single cropping, mix cropping, with pesticide, fertiliser or irrigation)?

3.4.2 How much it should generate in income and how often?

3.5 What support it is expected from the promoters to cultivate such as crop in 3.4.

3.7 Do you have an advice, which you think will contribute in the improvement of standard of living due to good agricultural production and marketing**?**

1. [Yes] ----
2. [Non] ----

What?

Thank for the advice and information provided. We will come back to you to inform you about the results of this study.

Annexure 5. Questionnaires about labour requirements to selected household-heads (12-19 October 2002)

Interviewer: Village:
Crop:

	What time do you start with cultivation activities?	What time do you stop for rest?	What time do you restart after rest?	What time do you go back home?	How many days per week?	How many weeks per months?	How many months during the year?	Observation
Land Clearing/tree cutting								
Seedling								
Ridge making								
Soil preparation								
Sowing of early crops								
Sowing of late crops								
Transplantation								
Fertiliser application								
First weeding								
Second weeding								
Third weeding								
Thinning								
De-budding								
Pest and disease control								
Harvest								
Threshing								
Dryer preparation								
Drying of products								
Transport to the village								
Grading								
Bagging and storing								

Ask the respondents to rank in descending order the 12 months of year based on labour demand.

MONTH	RATING (0 = LESS LABOUR DEMANDING MONTHS; 11 = INTENSE LABOUR DEMANDING MONTH)
JANUARY	
FEBUARY	
MARCH	
APRIL	
MAY	
JUNE	
JULY	
AUGUST	
SEPTEMBER	
OCTOBER	
NOVEMBER	
DECEMBER	

Information about agricultural calendar

1. What month of the year you start with the first agricultural operation? What operation?

2. What month of the year you end with the selling of the outputs?

3. What are the most boring operations?
Why?

General questions for all the crops to be cultivated

1. Which of the following operations bore you most?

Operations before the harvest (such as land clearing, land preparation, and others) Yes _____

Why?

Operations after the harvest (drying, grading, transportation to village, transportation to the selling point) Yes _____
Why?

2. Present a pair of crops for cross comparison and ask the respondents to say what is the most labour demanding to cultivate. Write the name of the most demanding crop in the respective cell.

Tobacco	Cotton	Paprika	Sesame	Sunflower				Mark	Observaçao para a mais cotada
							Tobacco		
							Cotton		
							Paprika		
							Sesame		
							Sunflower		

3. What solution that you apply with your own resources to alleviate problems related to lack of labourers in order to increase your cultivated land?

1. ----------
2. ----------
3. ----------

3.1. Which of these are easily implemented?

1. ----------

Why? ----------

2. What solution you apply with the help of someone or an institution to alleviate problems related to lack of labourers in order to increase your cultivated land?

1. ----------
2. ----------
3. ----------

4.1 Which of these are easily implemented?

1. ----------

Why? ----------

Annexure 6. Household composition, dependents and effective labour (n = 287, Cuamba, September 2002)

	Total number of members	Actively involved in farming	Non-working member	Ratio between active and non-working members	External labour (ganho-ganho)	Members employed in others people farm	House-hold effective labour
	Number	Number	Number	Number	Number	Number	Number
Average	**4.8**	**2.3**	**2.5**	**0.5**	**0.7**	**0.7**	**2.3**
Wealth status							
Poor	4.7	2.2	2.4	0.5	0.3	0.8	1.8
Middle class	4.7	2.2	2.5	0.5	1.0	0.7	2.5
Wealthy	5.4	2.5	2.9	0.5	1.7	0.3	3.9
Age							
<20	3.7	2.4	1.2	0.3	0.2	0.9	1.8
20-40	4.5	2.1	2.4	0.5	0.7	0.8	2.1
40-60	5.3	2.4	2.9	0.5	0.9	0.6	2.7
>60	4.7	2.6	2.1	0.4	0.4	0.4	2.6
Literacy rate							
<4	4.8	2.3	2.5	0.5	0.7	0.6	2.3
4 to 7	4.7	2.1	2.5	0.5	0.9	0.7	2.3
>7	5.3	2.9	2.4	0.4	0.8	1.4	2.3
Marital status							
Divorced, single with children, second wife	3.6	1.6	2.0	0.5	0.1	0.4	1.4
Single without children	2.6	2.0	0.6	0.1	0.4	1.0	1.4
Married	4.9	2.3	2.6	0.5	0.8	0.7	2.4
R (against wealth status)	0.105	0.101	0.084	0.042	0.254	-0.152	0.283
Critical r (95%); = t/(t^2+n-2)[1]	0.115	0.115	0.115	0.115	0.115	0.115	0.115

[1] *Factors significantly related to wealth status if R is larger than the critical r (95%).*

Annexure 7. Cross tabulation data between wealth status, age, literacy level and marital status (n = 287, Cuamba, September 2002).

	Wealth Status of Household Heads			Age of the Household Head				Literacy Level of Household Head			Marital status		
	Poor	Middle class	Wealthy	< 20 years old	20-40 years old	40-69 years old	>60 years old	< 4 years of school-ing	4-7 years of school-ing	>7 years of school-ing	Divorced single with children, second wife	Single without children	Married
Coding used for data	1	2	3	1	2	3	4	1	2	3	1	2	3
Mode	1				2								3
Frequency	148	103	36	9	168	87	23	228	51	8			
Wealth status													
Percentage	52	36	13	3	59	30	8	79	18	3			
Poor	100			4	57	32	8	76	20	4	15	3	82
Middle class	0	100		3	67	24	6	85	14	1	3	1	96
Wealthy			100	3	42	44	11	78	19	3	0	0	100
Age													
<20	56	33	11	100	0	0	0	67	22	11	0	11	89
20-40	51	42	8	0	100	0	0	72	24	4	8	2	89
40-60	53	29	17	0	0	100	0	91	8	1	10	0	90
>60	57	26	17	0	0	0	100	100	0	0	4	0	91
Literacy													
<4	50	38	13	3	53	35	10	100	0	0	8	1	90
4 to 7	57	29	14	4	82	14	0	0	100	0	10	2	88
>7	75	13	13	13	75	13	0	0	0	100	0	13	88
Marital status													
Divorced, single with children, second wife	88	13	0	0	58	38	4	79	21	0	100	0	0
Single without children	80	20	0	20	80	0	0	60	20	20	0	100	0
Married	48	39	14	3	58	30	9	80	18	3	0	0	100

Annexure 8. Number and ownership of livestock in southern Niassa (n = 287, Cuamba, September 2002).

	Number of goats	House-hold owning goats %	Number of lambs	House-hold owning lambs (%)	Number of chickens	House-hold owning chickens (%)	Number of Ducks	House-hold owning ducks (%)	Total number of live-stock	House-hold owning at least one livestock (%)	Total in money US$
	0.7		0.1		3.4		0.3		5.2		16.6
Average Overall (%)		11		2		48		0.11		0.57	
Wealth status											
Poor	0.0	1	0.0	0%	2.3	39	0.2	8	3.0	42	4.5
Middle class	0.8	17	0.1	1%	3.6	53	0.4	13	5.7	65	17.1
Wealthy	3.6	36	0.8	11%	7.2	72	0.5	17	13.4	89	65.0
Age											
<20	0.6	11	0.0	0%	2.1	33	0.0	0	3.1	33	10.5
20-40	0.5	10	0.1	1%	3.7	49	0.3	10	5.2	57	13.5
40-60	1.0	13	0.3	5%	3.2	49	0.3	12	5.4	58	21.0
>60	1.3	17	0.0	0%	1.8	43	0.4	13	4.1	57	19.3
Marital status											
Divorced, single with children, second wife	0.1	4	0.0	0%	2.6	42	0.4	8	3.5	42	5.8
Single without children	1.0	20	0.0	0%	2.8	60	0.0	0	4.6	60	17.2
Married	0.8	12	0.2	2%	3.5	49	0.3	11	5.4	58	17.7
Literacy level											
<4	0.8	11	0.2	2%	3.6	50	0.4	11	5.6	58	18.0
4 to 7	0.5	12	0.0	0%	2.7	43	0.3	12	4.1	51	11.3
>7	0.6	13	0.0	0%	2.0	63	0.0	0	3.4	63	11.1
R (against wealth status)	0.509		-0.491		0.195		0.109		0.402		0.431
***Critical r (95%); = t/(t^2+n-2)*[1]**	0.115		0.115		0.115		0.115		0.115		0.115

[1] *Factors significantly related to wealth status if R is larger than the critical r (95%).*

Annexure 9. Number and ownership of agricultural implements, bicycle and sewing machines (n = 287, Cuamba, September 2002)

	Number of hoes	Number of mache-tes	Number of axes	Number of sickle	Total implem-ents	Number of bicycles	House-holds with a bicycle (%)	Sewing Mach-ines	House-hold with a sewing machine (%)
Average	2.6	0.9	0.8	0.6	4.9	1.0		0.03	
Overall (%)							76		3
Wealth status									
Poor	2.4	0.8	0.6	0.4	4.2	0.7	61	0.0	0.0
Middle class	2.7	0.9	0.8	0.6	5.1	1.1	91	0.1	0.1
Wealthy	3.5	1.5	1.1	1.1	7.2	1.6	94	0.1	0.1
Age									
<20	2.0	0.4	0.4	0.4	3.3	1.0	78	0.1	0.1
20-40	2.5	0.8	0.7	0.5	4.6	1.0	78	0.0	0.0
40-60	2.8	0.9	0.8	0.6	5.2	1.0	74	0.0	0.0
>60	3.0	1.4	1.0	1.0	6.4	0.9	70	0.0	0.0
Marital status									
Divorced, single with children, second wife	1.8	0.6	0.4	0.3	3.2	0.4	38	0.0	0.0
Single without children	1.8	0.6	0.4	0.4	3.2	1.0	60	0.2	0.2
Married	2.7	1.0	0.8	0.6	5.1	1.0	81	0.0	0.0
Literacy level									
<4	2.6	1.0	0.8	0.6	5.0	1.0	77	0.0	0.0
4 to 7	2.5	0.7	0.6	0.4	4.2	0.9	78	0.0	0.0
>7	3.9	1.0	0.8	0.5	6.1	1.1	50	0.1	0.1
R (against wealth status)	0.217	0.259	0.194	0.229	0.331	0.285		0.158	
***Critical r (95%); = t/(t^2+n-2)*[1]**	0.115	0.115	0.115	0.115	0.115	0.115		0.115	

[1] *Factors significantly related to wealth status if R is larger than the critical r (95%).*

Annexure 10. Stepwise regression of financial and pratical aspects of profitability of cash crops in southern Niassa (summary of crop information from a survey involving 287 respondents)

		PREFRANK	PRICRANK	YIELRANK	INPGRANK	LABGRANK	PRRERANK	ACCINPUT	ACCEXTEX	ACCBUYER
Pearson Correlation	PREFRANK	1.000	.257	.943	.143	.486	.829	.600	.829	.429
	PRICRANK	.257	1.000	.143	-.600	.143	.600	.143	-.086	.200
	YIELRANK	.943	.143	1.000	.086	.429	.771	.657	.771	.371
	INPGRANK	.143	-.600	.086	1.000	-.371	-.029	.429	.657	-.086
	LABGRANK	.486	.143	.429	-.371	1.000	.086	-.371	.086	-.086
	PRRERANK	.829	.600	.771	-.029	.086	1.000	.771	.657	.600
	ACCINPUT	.600	.143	.657	.429	-.371	.771	1.000	.771	.371
	ACCEXTEX	.829	-.086	.771	.657	.086	.657	.771	1.000	.257
	ACCBUYER	.429	.200	.371	-.086	-.086	.600	.371	.257	1.000
Sig. (1-tailed)	PREFRANK	.	.311	.002	.394	.164	.021	.104	.021	.198
	PRICRANK	.311	.	.394	.104	.394	.104	.394	.436	.352
	YIELRANK	.002	.394	.	.436	.198	.036	.078	.036	.234
	INPGRANK	.394	.104	.436	.	.234	.479	.198	.078	.436
	LABGRANK	.164	.394	.198	.234	.	.436	.234	.436	.436
	PRRERANK	.021	.104	.036	.479	.436	.	.036	.078	.104
	ACCINPUT	.104	.394	.078	.198	.234	.036	.	.036	.234
	ACCEXTEX	.021	.436	.036	.078	.436	.078	.036	.	.311
	ACCBUYER	.198	.352	.234	.436	.436	.104	.234	.311	.
N	PREFRANK	6	6	6	6	6	6	6	6	6
	PRICRANK	6	6	6	6	6	6	6	6	6
	YIELRANK	6	6	6	6	6	6	6	6	6
	INPGRANK	6	6	6	6	6	6	6	6	6
	LABGRANK	6	6	6	6	6	6	6	6	6
	PRRERANK	6	6	6	6	6	6	6	6	6
	ACCINPUT	6	6	6	6	6	6	6	6	6
	ACCEXTEX	6	6	6	6	6	6	6	6	6
	ACCBUYER	6	6	6	6	6	6	6	6	6

Annexure 10 (continued)

Variables Entered/Removed (a)

Model	Variables Entered	Variables Removed	Method
1	YIELRANK	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a Dependent Variable: PREFRANK

Annexure 11. Current and projected future cash crop preferences (CCP)

Tobacco and food crops were discussed fully in Chapter 8 as they were the most important crops; to see whether food crop preference would overtake that of tobacco. For completeness, the remaining crops are discussed here, but are currently less preferred.

A. Cotton

Niassa province falls under JFS Company's concession for cotton cultivation and marketing. The average rank (2.9) placed cotton as the third most preferred cash crop in line with smallholders' preference (Table 8-6). In spite of being the least profitable cash crop, cotton was the third preferred cash crop because of access to inputs (mainly seed), extension, experience, and presence of buyers. Farmers reported that cotton provided a secure income because the buyer was available and accessible, although not reliable in terms of time and place of buying. The percentage of farmers participating could be maintained or increased slightly if prices were stabilised and increased, and the buyers became more reliable. The existence of highly profitable tobacco and continued increase of sesame price may threaten the cotton industry in northern Mozambique as more producers would prefer to market tobacco and sesame to the detriment of cotton. However, the presence of these competing profitable crops may increase the price of cotton as a reaction of the cotton industry to attract more smallholder farmers to cultivation of cotton.

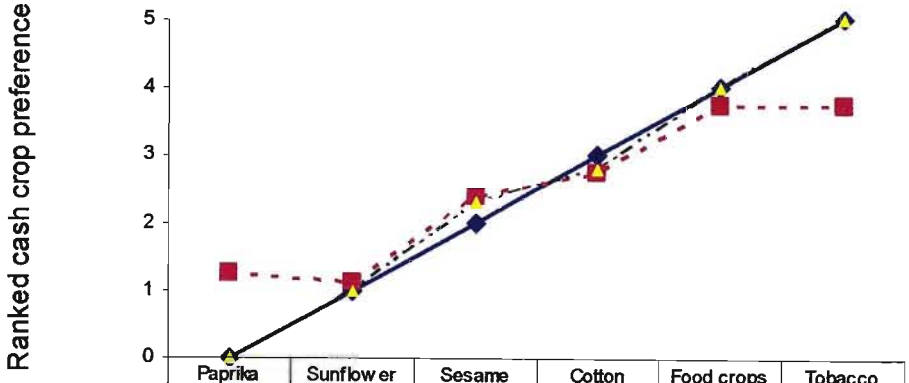
B. Sesame

The average ranked profitability (1.9) for sesame suggested that it was preferred in fourth place. The advantage of sesame was its relatively low costs and ease of cropping. However, much was needed for sesame to become one of the preferred cash crops in southern Niassa. Low prices (compared to Nampula), low yield, lack of seeds, lack of extension and lack of buyers were some of the problems affecting smallholders' lower preference for sesame. Improvement in these conditions could improve farmers' preference for sesame.

The price in the 2001/2002 agricultural season was 15 percent of the CIF (Cost Insurance and Freight) in full price in European Union (information from Public Ledger dated December 2002). This price increased to US$0.25 in the 2002/2003 season due to competition between WR-SempreVerde and União dos Camponeses e Associações a Sul de Niassa/OXFAM for control of the area and groups of farmers. Local buyers were also involved in the buying of sesame in the villages for re-sale to the Export Marketing Company stores. In addition, Export Marketing also

had its own buying brigades. As a consequence the demand for input increased. An additional increase in price for southern Niassa sesame was possible when takes into consideration that farmers in neighbouring Nampula province (400-800 km away) were paid two times more (US$0.5/ kg) than the price paid to smallholders in Niassa (US$0.32/kg) during the agricultural season 2003/2004.

Figure 8-6 suggested that, if no change occurs in other crops while increasing the price of sesame, making seed available and improving the buying network, there would be an increase in the "intensity" of sesame preference but the crop would still maintain its fourth position after cotton. This suggests that the percentage of smallholders cultivating sesame may slightly increase, attracting some cotton, sunflower and paprika growers.



	Paprika	Sunflower	Sesame	Cotton	Food crops	Tobacco
Actual preference	0	1	2	3	4	5
Projected using average rank	1.25	1.13	2.38	2.75	3.75	3.75
projected using regression model	0	1	2.3	2.8	4	5

Figure A11. Projected sesame preference if price, access to input and access to buyer is improved.

C. Paprika

According to the average ranked profitability (1.5), paprika should be the fifth preferred cash crop after sesame. However it was the least preferred cash crop based on the percentage of smallholders participating while sunflower occupied the fifth position. Most financial indicators of profitability and smallholders' ranked indicators of profitability put paprika as the second most profitable cash crop. Paprika promotion needed to be linked with supporting services to increase yield through provision of inputs and extension services. The marketing system also needed major improvement.

D. Sunflower

Sunflowers average ranked profitability of 1.25 suggests that the crop was likely to have few households participating in its market in line with the percentage of farmers actually participating. Low yield, low price, lack of seed, lack of extension, lack of buyers and high cost of inputs in relation to sales affected sunflower cultivation and preference negatively. Increase in the sunflower production was essential to revive the oil industry in northern Mozambique. The industry was on the verge of collapse due to lack of raw material caused by low cultivation of sunflowers by smallholders. It was possible to increase sunflower production by improving the negative factors mentioned above.